Department ARCHENT
280 W. Maude Ave
Sunnyvale, CA
Subject
Name GEEL
Address 85 E. India Row
617-[illegible]

43-648 11¾" x 9¼" 4x4 Qu

National® 75 Sheets

Brand

Computation Notebook

National Blank Book Company Holyoke, MA

August 1989 —

Reward 1

↳ Phones 415 949 2735
617-742-9870
450 Old Oak Ct.
Los Altos, Ca 94022
C Gordon Bell

K-Eng. visit 7/31, 8/4 — 3-5, 16-17, (24), 44, 58., 88 (alt. partner)
Dongra - 120

ARDLAR talks — 6-11, 22-23
Constants 12-13
Wave Tracer 14-15
Plumbing (Vectors) 18-19
Blankco. 26-
Datawest installed 20-21
VISIX (28), 62, 108
Netframe (Carl Amdahl, etc) 30
Cirrus Logic 32, 54,
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ETS Supercomp 50
Cray switch 46.
CPM Papers 40
DCC 9K 38
~~Cirrus~~ ~~54~~
Hypers 56
KSR (Cray visit) Smaby 58
Sutherland Logical Effort 52
Kubota Co. Org chart 60.
Skate/BBN 66
Intel 70, 73, 76 (Cutler), 78 82, 84, 112
Nijs 74
BTL Plan 9, Boston Talk. 80.
SF 2 86, 110
Negatron Products ~~92~~
Fluid/Fluent 90, 124
BMD Business 92, 114
General Conference 94
UVC 96
Austek 64
Mpsizvstem 63
BMC Bookmart 96.
Cascade 102
IMS (meta-sys 2 emulator) 104
Losing computer 97
Compute Taxes 110
~~BMT, DEC~~ ~~114~~
Newcastle
Vroid
Bill Avery Co 118 65

BMT/Dec — 114, 116, 122
BMT Equity -

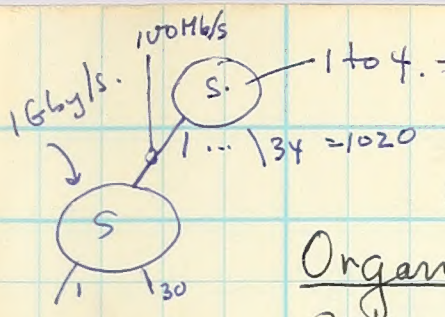
• Gordon Presents — 120

• KPCT — 124
• Augustus — 126

Constants

Digitized by the Internet Archive
in 2015

https://archive.org/details/originalnotebook00gord



UCSD.

KSR 617 895-9400

8/4/89. and (7/31) + report (1 day)

Organization

pooling of resources

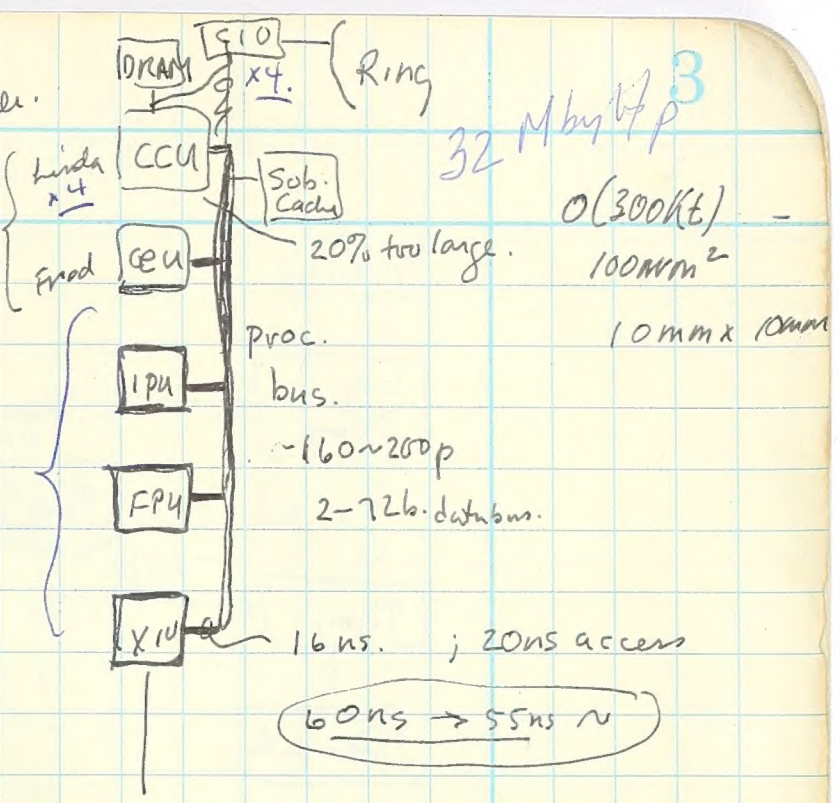
ceu/xiu Pete Schnorr — FC
John Rokoff — xiu.
Fred Webber — no exp.
(Michel Maas) — ETA. junior. GA

fpu/ipu Dave Ep.
Brad Byers — ipu-junior GA
Steve Allen — senior. fpu-full custom. FC.
(Jay W) DG.

ccu/ciu Ruth Schelly GA
Linda Lee — SW
Paul Barth SC+GA
Mark Standish!

Steve Frank — Ring 0 arch.

Ring 0. 6 Chips
Ring 1 = 1 Chip

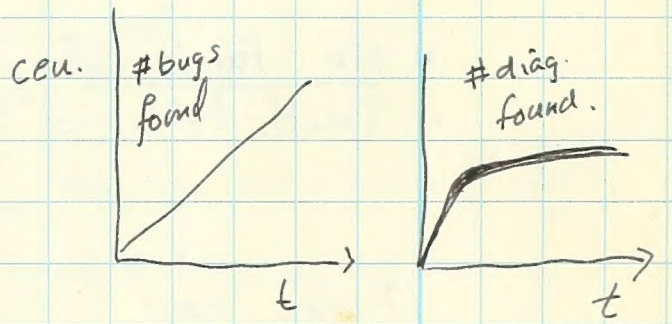


32 Mbyte/p 3

O(300Kt) — 100mm²
10mm x 10mm

ccu — 150 states. + 12 Kg.
(3Kg in rule blocks)

ceu — 40-50 States.
10Kg control.



~~Organization~~

Changes
1. Test vector / chip to isolate the design → NO Cross-checking (Design by Construction)

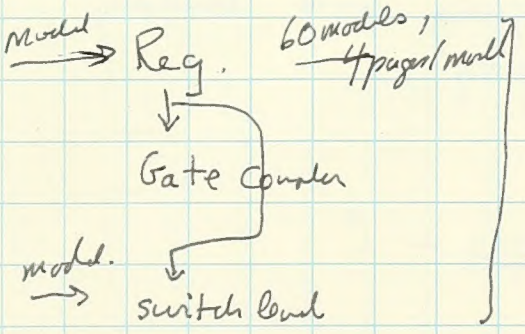
SW people
. not worry about time.
. " " " area.
. no fear of complexity.

Reasonable Methodology
. 2 implementations for check
. Valid. RTL.
. way to run other parts.
. Runs SW

Quick turn. ~~Disadvantages~~

Fears

1. 2. chips by inexperienced people!
   — will they work? stuck in dr/simul.

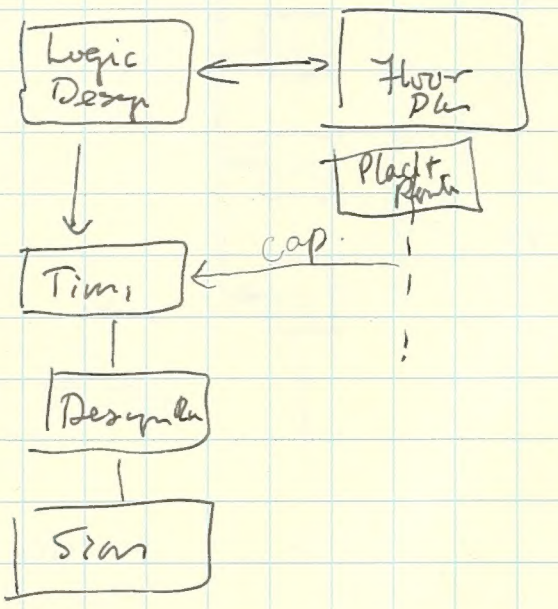


2. Complex, but small # of simulation ~
   5 sec/clock.
   (need 10X) don't know yet.
3. Study of SC / full custom —
   how many chips behave as logic says?
   DG, symbolics (4 chip cases, 3 didn't work) → Billy I was a rock.
   Spice simplification
   VTI-15% -20% fail ⟹ noise, coupling, clock,
4. 2 passes: hard to do
5. Tools. Library.

previous

v.s. logic → Sim → t/c.

Process



Shrink

- No Functional spec. for each chip. (NO specs/chip)
- Truth table → Synthesize gates.

Rules now

Familiarity

Set of clocking
load, fanout, what
allowable configs.
finite set of
Latch models only

- no feedback.

3 Variables - too many.

→ CAD tools changing and buggy. → Implementation
→ arch. changing
→ CKTs "

Chip-level specs - ?

Design Rev.
· 2 people reviewers + I/C ckts. + chip team
· identify bugs.

Who's Schedule?? Pkg Mgrs. Where's Test chip on schedule?

Ardent

· 12/87 chips arrive; run 1st compiler 1st 2 years.

· 5/1 Beta
· 7/1 FCS.

Cst

To do

Call; Melanson, Mudge, Cutler, Sites, head hunter. Peters
~~Work Matsuda~~ sw sim.
write HB: Tools #1; morale, (one more custom / chip!) → get rid of salesmen — they talk!
summit thy / with expend, clear head, may need arch + Dave Conn; things could break good when all gets clear
No arch, experience level, never been done before, sft ~ 2.0., home built tools, no specs,
loss of performance, no stars ⇒ unclear A vs B people.
Frank unlucky! new arch idea, IT's sun, Not a super,

too long, likely to be competitors in evol.,
large mP/mC > perf.
chip layout looks crazy ⇒ a ⇒ control — trim
New arch.
long turn ~ 4 years

design method —
no cross check
- small # of, ~ / sim

1 year custom → ~? g/person

Get

964-1000 x 500 JWP (Somerset st.)
484-7763 H.

2nd Q → 3rd Quarter for MIPS

Compiler license
1500 → 750

· RTL → fully entered.

8/5

Slipstream
→ 28 Mhz

8 x 14 Mhz chip

+ or x , +(+)*

⇒ (224 Mflops/s.) per processor.

· (Interfaces?) scalar; vector; synchronization; fdi ← graphics interface
Done'.

Issues:
who can go? G3, Titan-follow-on;

4K ⇒ 2150 MHz

2 ticks / x+ ⇒ 100 Mflops.

mP support

SW

V.3 w BSD → V.4

Ent TCP/IP ; NFS → FDDI

NCS (2K)

Fortran — VMS, Cray, Convex

ADA Rosolve (Verdix, Meridian)

MOTIF

X 11.3 → .4

Phigs + (

qvs, artifact, Dore' → Resolve technology IBU.

HSC — Slipstream STP

for business

Ultranet — ~~R~~ 2000

01

Std. Stiletto. 51

+G/S Vector. Model 52

NGen 53

Slipstream

Shipstream RX 150

Big 55.

Kill P3/G3

→ 04

~~Std. Stiletto 5T~~

GS 2500

P3/G2

Shipstream (ISP change, Concurrent mod)

Old GS Customers

Old Titan "

→ Old Mach

Some compatible w/ 3rd Party.

Kill G3., Trigon, Titan

8

Ainsle. Ainsle. '90

95

5 svc.

CGS	47.5
M	4.5
Sv	4.5
Rosen	4.0
	60.4

R/D	13	(5.6 + 4.35) × 2 ~ 20
Sal.	14	17 now
MK	5	8.6 = 5 + 3.6 ?
F/A	4	6.
	36	

agreement

- 150 → 120 (20% reduction)
- Hiend →

Plot ~~Stellar Whetstones~~ Perf. vs. % Vectors

Stiletto

P2

P3

SG1,...4 — ~~16~~/25 MHz ; (+ 16 MHz M120)

GS 2000, 2500

Slipstream. I, II.

C2

1. How does Stellar compete w/SGI? Why do they lose?
2. What whetstones? what L^2 on 2K, 2.5K = 2? 1K = 1.4

L^2 28 MHz

→ whets, Dhrys, Linpack, L^2 = (2, 2.5, Slipstream,

3. Ardent will look at cost to finish P3 vs. all resources → Stiletto now.
4. S will look at cost ~~&~~ & time to go to R-isp.

MIPS R6K 70 MHz 3x M2000 @ 25 MHz (14.5 hs)

		(16)	(32)	25	x3	P3
• Dhrystone	100K	~~23~~.4		42	126	51
• L^2	~8 Mflops	1.8		2.7	8.1	4.5
• Linpack.				3.6	10.8	9.5-12
• Whetstones		~~11~~.09		~~13~~.5	40.5	19-22
Linpack				6.6	19.8	

2.7 13.5

- nee
- YMP or XMP.
- C-2
- T/P3; x4
- MIPS @ 25
- MIPS @ 6000.
- 4~8 MIPS @ 25
- i860

- Theoretical PK
- Bus B/W
- L^2 — workload
- Dhrystone
- Whetstone (scalar)
- Linpack
- Linpack.
- 1000 x 1000.

Why ↑

th

8/15/89.

Resources.

	Stellar	Titan	Stiletto
Leader			1 + 1
CAD	4	2	
Perf/Arch.	1	3	
HW	1	1	
CPU	16	3 + 3 diag + 2 tech	
Graphics	8	3 + 2 C	7 (-3)
I/O	5	1	
Mech.	4	2	1
	39	23	11
SW	1	1	0
OS + debug	6	6	2
Comm.	3	—	
hang/Lib.	7	6	3 (+Lib)
x11; Phigs	7	4	-2
Doré	—	4	
AVS/A	4	3 + 1	-3
SW Deliv.	2	2	
Pubs	2	3 4	1 -1
O'hd	1 + 3	1 + 2 sect.	
Total	76	55 5+2 graphics	20 +7

150 → 120

WP, PJ, GB, GM, MS

#1 ENTER 1Q 91 WITH MIPS/GS VECTOR BASED FULLY COMPATIBLE FAMILY CONSISTING OF SLIPSTREAM & STILETTO, AND MAINTAIN SOURCE LEVEL COMPATIBILITY WITH OLD (PX/GS) PRODUCTS.

#2 MAINTAIN A COMMITMENT TO PRESENT CUSTOMERS THROUGH CONTINUED SUPPORT OF EXISTING PRODUCTS, GS2500, AND STILETTO.

#3 REDUCE COMBINED R&D RESOURCES FROM 150 TO 130

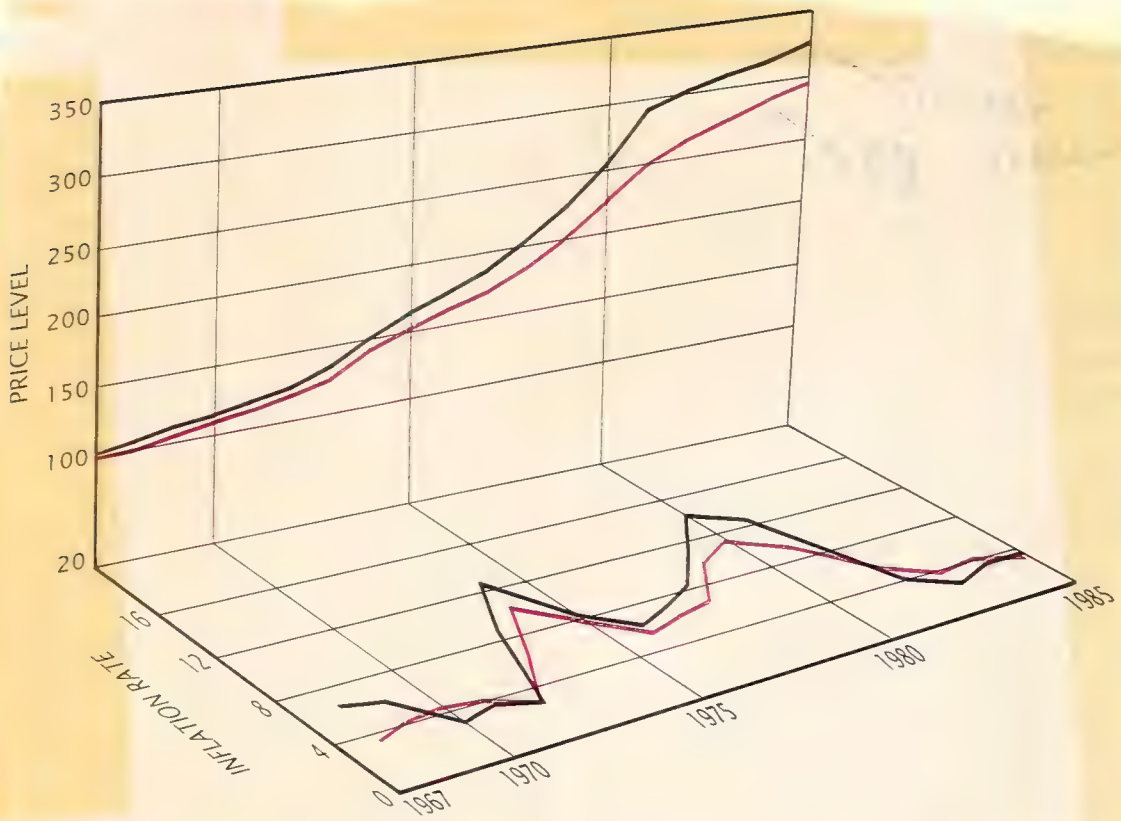
#4 FINISH GS2500 FOR MAXIMUM GRAPHICS AND IMPROVED GS SCALAR PERFORMANCE.

5 SUBJECT TO RESOURCE CONSTRAINTS AND REVENUE CONSIDERATION:

a) FINISH P3 (NOT 63) FOR ENHANCED SERVER & SCALAR MARKET

b) FINISH SLIP[illegible] ST[illegible] A

Ian Edmonds 508-[illegible]

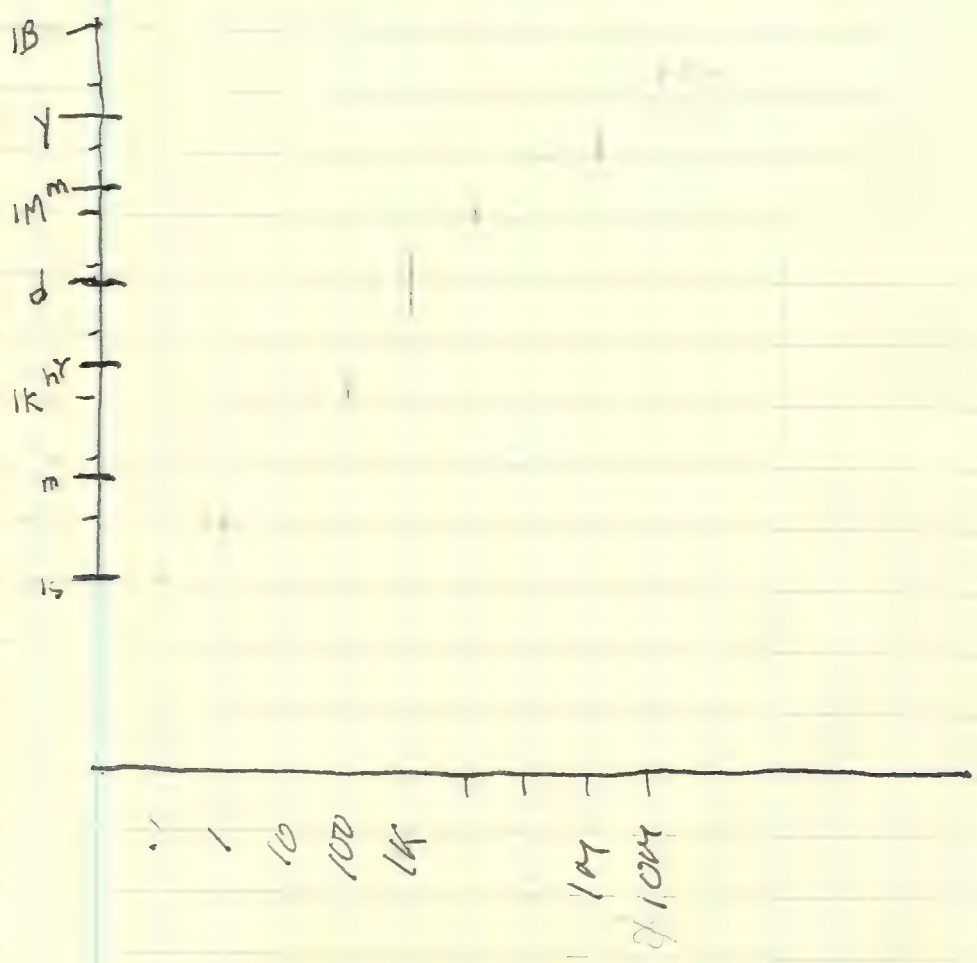


CONSUMER PRICE INDEX (red) *measures only the cost of goods. (The top graph shows costs; the bottom graph shows the annual increases as a percentage.) To gauge the pretax earnings needed to purchase those goods, the Bureau of Labor Statistics compiled an experimental Tax and Price Index* (black). *Indexing of tax brackets may have brought the* CPI *and* TPI *into step.*

Constants

- Micro century ~ 51 min.
- more μsec in a day than sec. in a year.

Decision time vs purchase price



Product life ~

75' – 5 yrs.

• 780 – 1/18 –

• 8600 – 2 '81 – 3 yrs. massage

89' 18 mos

Ardent

• 5/88 – 16 MHz } 17 mos.
• 10/89 – 32
• 12/90 50/100

What they say . . .	What they mean . . .
Product's 90% complete	We've got a name for it
Leading-edge technology	We can't make it work
Limited downside	Things can't get much worse
Possibility of shortfall	We're 50% below plan
Proven technology	It nearly worked once before
We're repositioning the company	We're lost
Upside potential	It's stopped breathing

Marketing — Product — Sales

2 out of 3.

– Trust Me. –
– Piece of cake –
– Don't worry –

– This is a tough one –

8/22/86 WaveTracer

EM (MIT) Benchmark.

6 hr uVAX 40^3
20 min WT 128^3 > x 32.768 larger x 18 =

∴ 576 x uVAX

12.5 Kf/node x 4K => 50 Mflops.

∴ uVAX = .086 Mflops

1/88 Self fund ceo + 2 p.
7/88 Seed close .25 M
12/88 1st Close (1.5 - .25) M (Still 300K to limited partn)
≈ 50% of company.

Sales

FY 90 1/90 - 6/90 1.2M
FY 91 5M

ADL (not on BoD)
BOD: Zi, Beatty (MIT Ostage - finance), Dick Spann (Applicon), Wang rep. V/C.
Co-f.

Size
ceo + 2 admin. + Bruce Campbell (coo + BoD)
7 { 2 Hw (asic + controller)
1 Arch (Jackson)
sw Mike Lee
sw Compiler
Diag
M.E.

- Tech writer
- Service
MKt (to come)
- Sales.

TAB
Mike Al Wozny.
Dan Tolym MD (Mass.

600 / 10K ~ 40K

9/7

- Low Observables.

- EM Prob. ½ x 38 Mflops for Cray 2 → 30M → 60M.
  └ on 4K node

10/9 - phone. Name for product. Advice on perf. calcs.

10/26 Bart Berstein

F-E ~ 2Pc Firefly

Reg: 192 bytes/proc	1K	½ Gip	100 Mflop (64)	16 Mby	~~200K~~ (170)
	16K	30 Gips ?	1.5 Gf (32) 600 (64)	256 Mbytes.	~~750K~~. (870)

Lee

4K - 2 Mflops ~10 w/ fixed point

multiple 1 VBrd (4 procs + 128 Mbytes) = 1 Brd. $ /proc / board

2/21. 0 (40K) for a 1board. System, array 21" x 16" →

9/7-8.

9/25 Stu

Ardent

1. Process

2.

• KSR

Matsuda

Masa Ishii – works for K.
(in between)

D-Core

2.15 Dhry/VUP

30.6K Dhry.
=14. VUP.

Visit to {
- Tae Sato, Chief Sci. (also Creation Clks, Corp Palo Alto.)
- Isao Hayashi
- Kiyoshi Agusa.

Yoshida. – "for" purchase.

KSR
(1.7K Dhry/MHz)
590 Dhrystones/clock tick

Hennessy

KSR

	Mips	
5/88	16 MHz. (2K)	
9/89	32 MHz (3K)	
1/90	75 est.	1.6 yr.
9/90	50/100 dyn Jun	1. 5/91 – 18MHz x (2)
3/92	100/200	1.5 5/92 30 x 2
		1.75
		2.0 12/93 50 x (4)

50 mips

18 mos

1 yr

2 1/2

3yrs. Clock

Scalar nec 40 Mf. 2.9 ns. (6 vector) – 1990
C90 4 – "

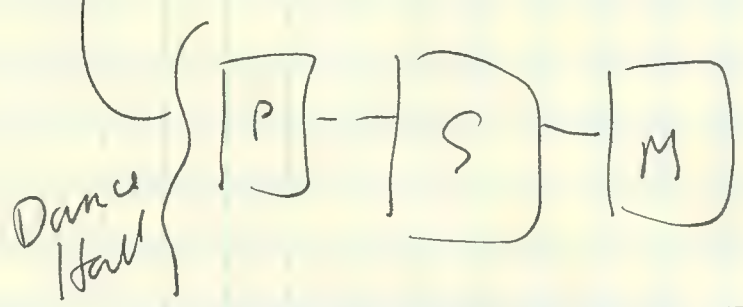
Linpack: ~~3.9~~ 100×100 = 3.1 ; Handcoded Blas 8.
~~1000×1000~~
1000×1000 =

Characterisation 360/158 @ MIP → Dave Cane. 360 mips
VAX ext = ~~2~~ IBM Fortran

Dave Dane's Tax.

Bus. — X = 1 3~30
Switch mode X = 2 30~300
Local mem X = 3,4

mP = $X^{m \pm .5}$



R4K. first real 107 Dhrystones vs (X 3.3.) down!

4K ≈ 8.5 L²
12 LP
140K Dhry
52 Whetstone.

Sophie

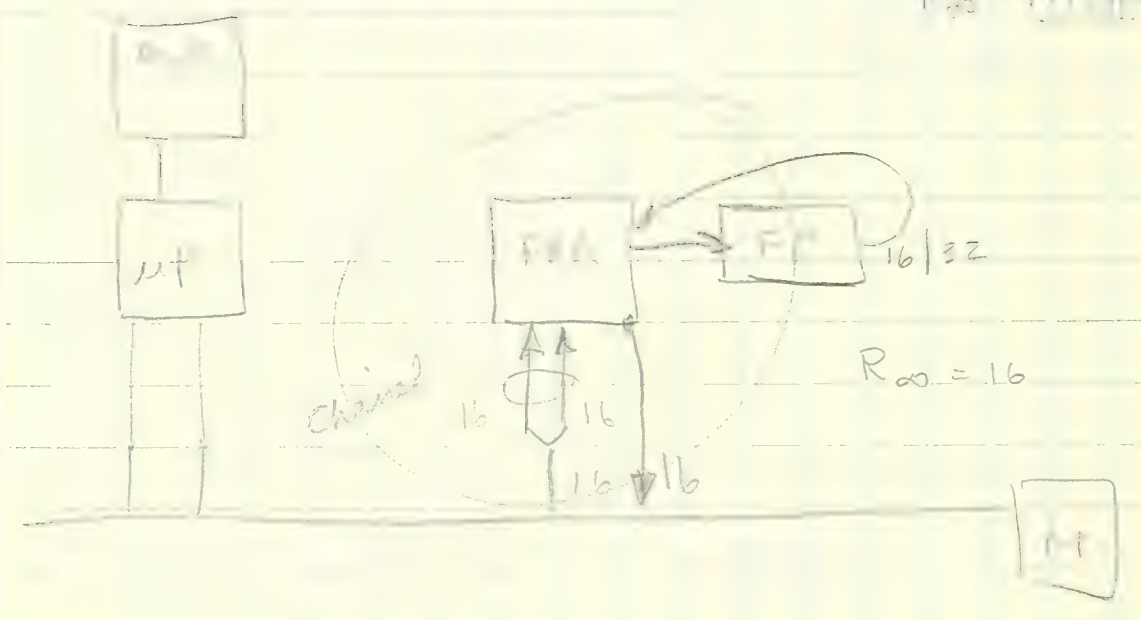
KSR 1.7 K Dhr / MHz. ~ 590 Dhr/tick.
2.15 KDhry / Vup

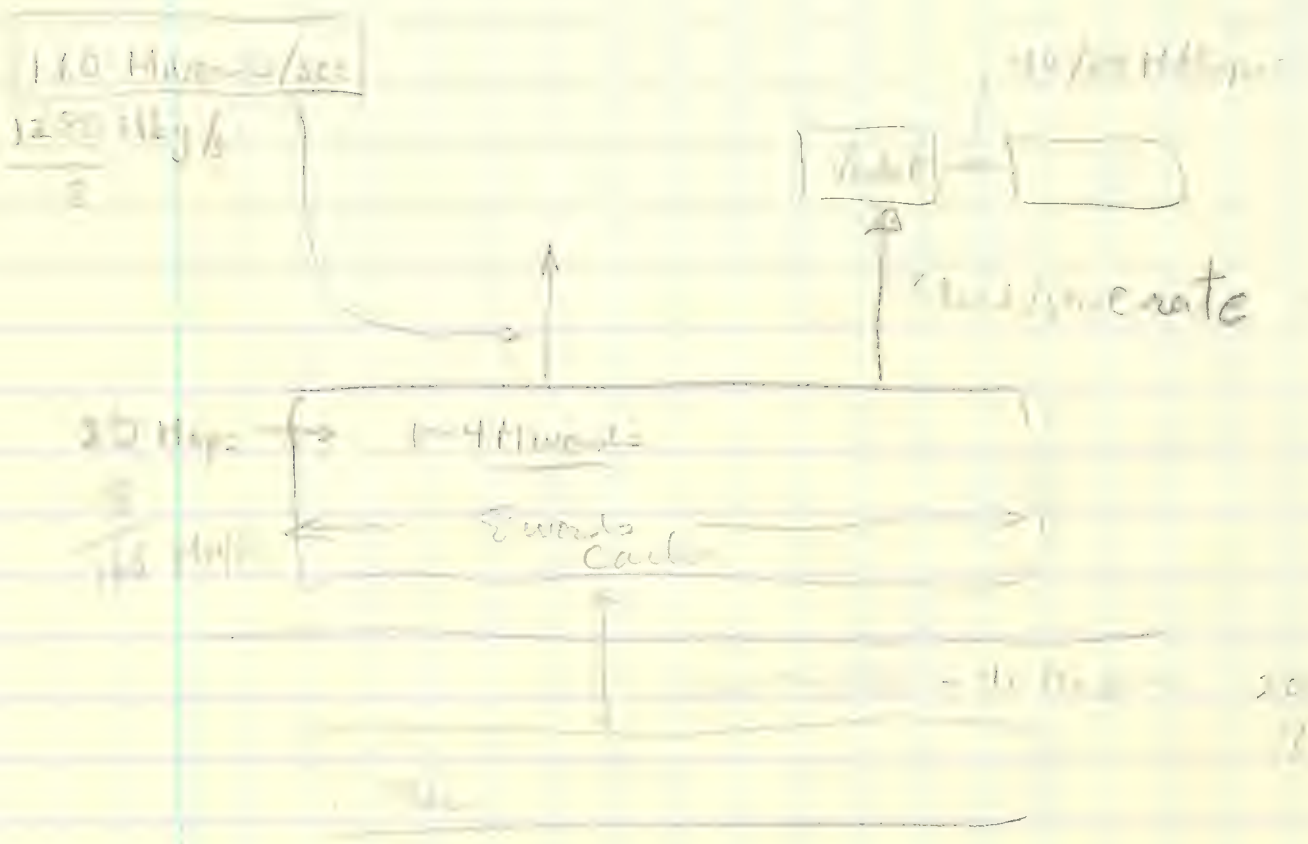
~~3.6~~

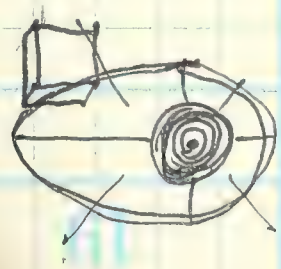
10/18/89 New date 10/91!
Cane/Dane

Cache miss penalties: direct 1 Main Cach 20 intaR 100
interR 200

6/90 KSR (18.5 MHz)
Dhry. = 39K inline, 30 w/o inlining
linpack = 38
Whets 11.1K inlin 7.5K w/o inlin
LLNL (468) 3.6 Mflops
Spec 3.1 Mflops


Channel
16
16
16
16
$R_{\infty} = 16$





20 ... close without / out flash / ... / Lens Stop (f-#)

# individual	Est. SS	[illegible]	[illegible] (Duration)	[illegible]	Factor 1000 x 1/SS
	1/4000	1	1	1 - 9	1 - 9
	1/125				
	1/64	~2	2	[illegible]	6.6
	1/30	~2-4	4 - 10	[illegible]	10 - 50
	1/15				
	1/8	~1	4	[illegible]	33
	[illegible]				
	[illegible]	~1 ~ 2	~17	[illegible]	166
	1/50	7.2; 8.1		[illegible]	578
	[illegible]				
	1/[illegible]		50	[illegible]	322
	[illegible]	18.75	150	[illegible]	2144
	1/30				

28
350 3090
2nd Use

400 3090
250 VF

2nd - 1 → 2nd
23 - 2
63 - 3
64 - 4
3 - 5
21 - 6 → 15.3

125
6 | 75
6
15
15

40 ea
85 ea
42

125

75 / pac.

4/30

Graphics interfaces no one wants
Stellar has a processor so slow nobody can use it.

Combined: Dore w/ a slow proc.
Stellar is easier to use, U. Pixels, AVS exactly.

People who like machines, John Aldat
" " " Apps

(Do GL) →

Supers 1 user 12K/yr. Orgay.

Cray 50K$ / Mbyte

at 1/4 a Gray yMP;

— Can provide 1500 hr/year!

Apps, Portability

JVNC SC-Large
1512 -
< 1522 - Hecking

9/6/89 @ Stellar.

AvD 401-863-7640; 245-0638H

1. Graphics retreat, TAB review,
2. KWeiler / MKaplan – send source license (not in package says A; was says MK)
   (ask MK to send it anyway).
3. AvD schedule TAB
   ~~Walt~~ Seitz, Rashid, Fuchs, Andy, Ed David
   + ETAB → Ed David, Thiele, Molecules,

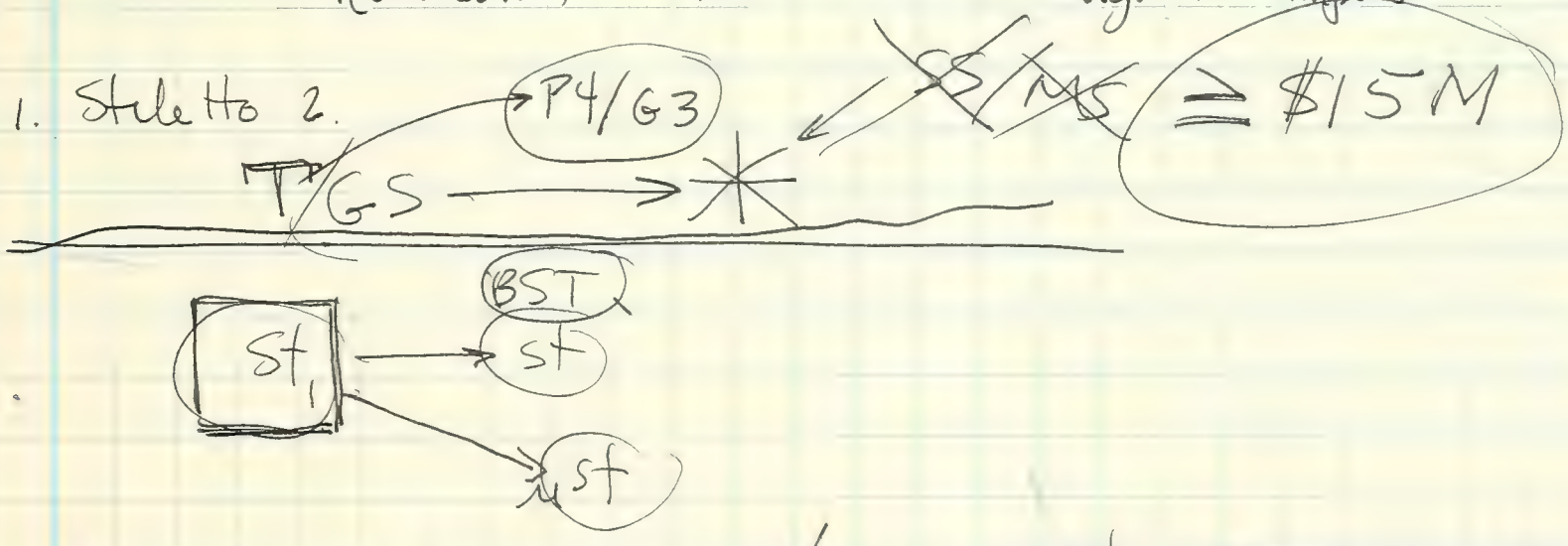
→ 4. TACC is Nick England @ Sun; Eileen McInnis,

5. Phigs + not optional. Phigs + respectable, not great.
   Geoff McMann AH, not a designer
   Golden opportunity: new Phigs +, internal arch, completes Spec.
   GL over Dore'
   Dore → DP+
   Figaro ~~Phigs +~~ AVS → AVS 3
   Art.
→ Poor perf.

c AVD gets 100K/yr. → 2K/wk = $400/d.

JWP. 10/17. c1: Q490 c2 MIPS 3K..(4K)..6K c3 wsp 75K.
Min(dev cost) 4K. tight mP impossible in tom form.

1. Stiletto 2.



JWP/III : GSM/MS / JHerman / W2 / Meeting!! | Darpa #, phase II, implementation look

KSR Time / Expenses

Expenses 7/31, 8/4

Mon

Car 157/2 =	78.50.
Tolls	1.50
Cab (7x)	33 00
KSR pd. Return.	
	113.00

Car 9/7-8

(110.39 + 6.90 Gas) × 2/3 =	77.53
Tolls (2 days)	3.00
Parky	17.00
	97.53

8/15 Kubota Ltr ~ ½ d.

9/9~18 ≈ ½ day. alt. fundy scenarios, risk, gsm recruit

10/10 gas 2. tolls 1.50 + 37.

10/9 ½ day.

10/10 1 day

11/6 1 day

Car 31.43

12/ -0

1 - 3 1/16-18 ⇒ 3 + 3/5 x

2 - 1 2/20

3 - 2 3/8 ~ KSR at Kubota + letter draft ⇒ ½; 3/21 - ½;

5 - 1 5/3 - KSR

6 - 3 (6/18, 19 ½, 20, 21 ½) = 3

7 0

8 (1) 8/1 day at Supercomputer hrs Alamos. Aug 19-24

9 3 9/4, 10, 12 + setup. 11/13 mtg.

10 3 10/29, 30, 31

11 2 11/12, 13 MCC visit

	~~A~~	EMT	VLSI
ibm	x	x	
Hitachi	x	? x	x
Fuji	x	x	x
Siemens	✓		
Philips	✓		
ICL.	✓	✓	?
NEC.			
Sun	?	?	?
HP	✓	✓	✓
DEC.	✓	✓	✓
Sharp	✓		✓
Status	✓	✓	○

Amdahl, Key.

sparc -

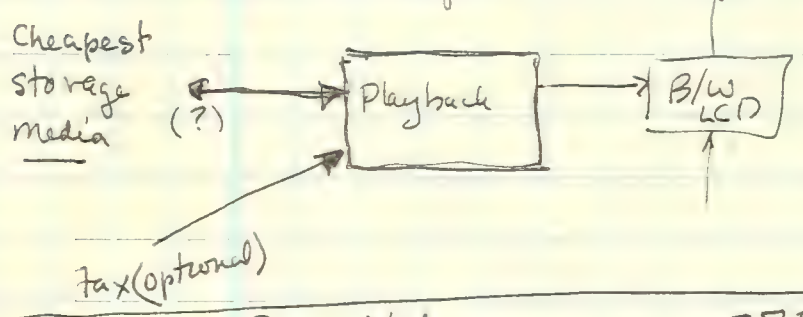
Spectrum - based

? - based.

Sharp ——— ✓ ✓ ○ ✓

B.J. Folsom

Blank's Jog. → Use fax input.



Interapt PostScript

Dave Nelson. 508-875-6415 Fluent Media Computers.
FCS Q290

End user: How do I deploy the document? (Binary Compiler)

- Hi end authoring
- Med: Acer, et al PC's w/bounds
- Lowend: Players.

Creates binay images

World class Computer: Can build it anywhere with local sources.

No Silicon; Don't touch Motherboard.

11/4/89 Visit Fluent — 15K-30K ; 8M ; 300M/052
player in 91 with Philips — CD rom, etc.
1Bdd – Sound over Stello, IBM Educ. Sys @ Atlant
150 (1 by [illegible]

Valuation ~ 1 year, ~ 1M.
20% – 50%
= f(proto.)

Constraints breed creativity. No new motherboard, No silicon
[illegible] small footprint, start with a large one to [illegible]

Visix — John Gillos — Robertson Stephens — 415-781-9700
Jay Whittaufer.
George Hoyen, Mkt/sales.
Roger Heinen 603-881-2846

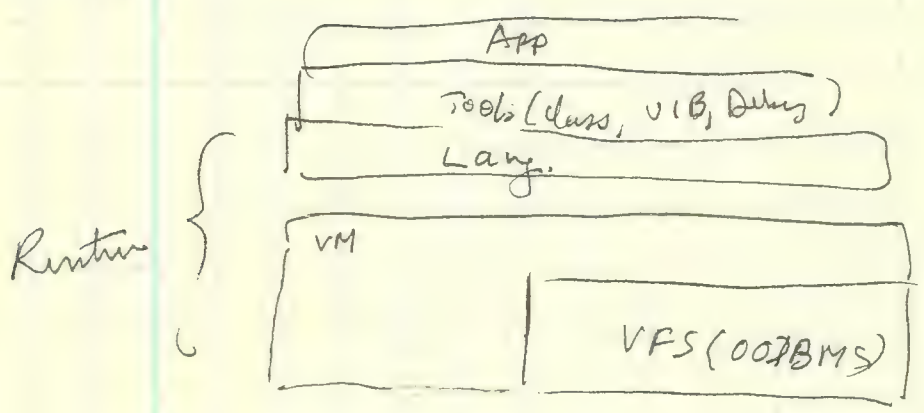
Dec — Scott McGregor — Palo Alto, ULTRIX
McInroe ← Crouse (Hemy)

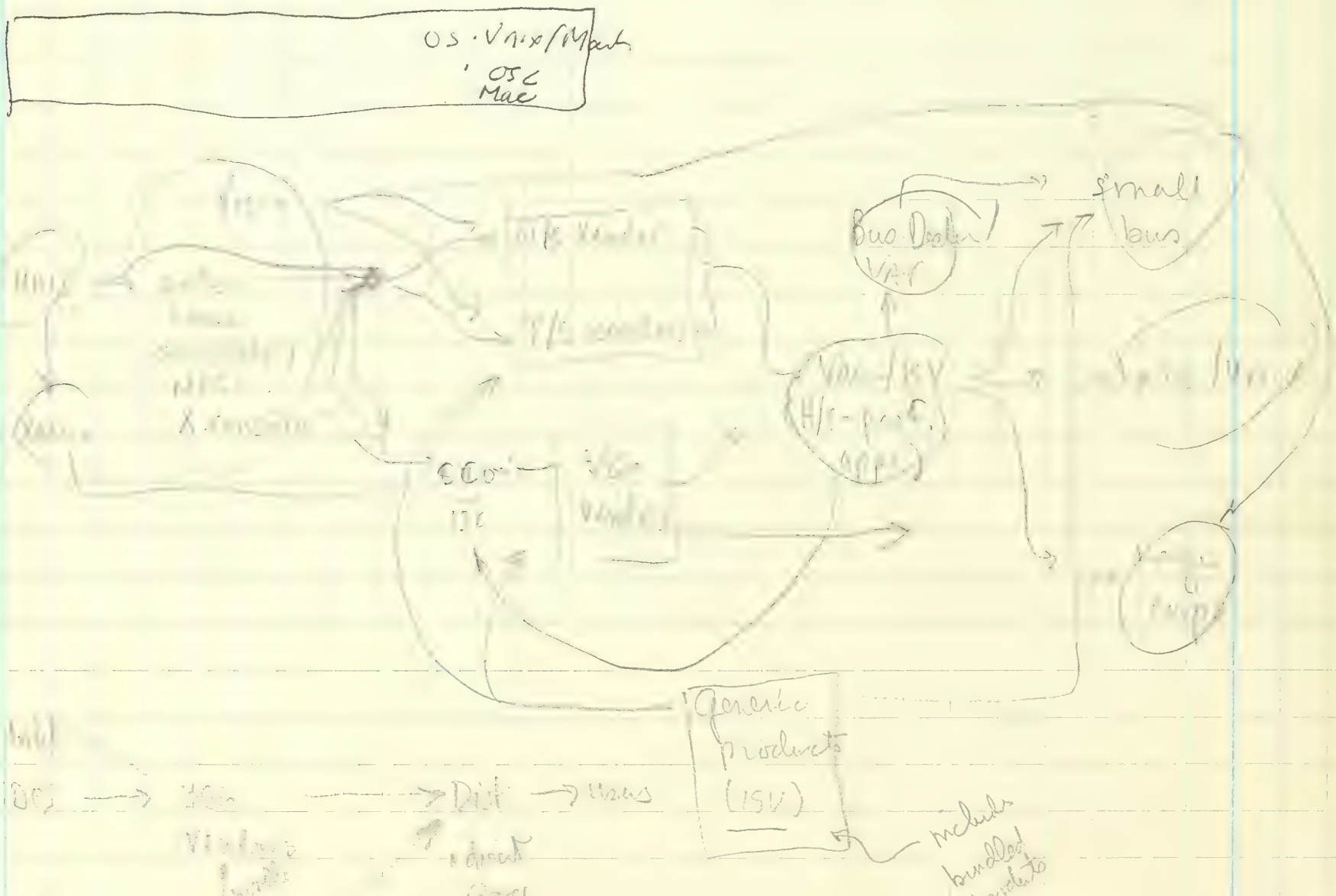
- Andy Heller — IBM / KP
- Bernie — Sun Connection
- John — " "

SCO/ISC — Unix → 386/486

Make a marketing map

Harbinger: Runtime + Dev. Environ't → small talk derivative





11/2/89 Expenses (Visix - Unix Expo)

Taxis NY 20+22.50

Taxis Bos 7- + tol

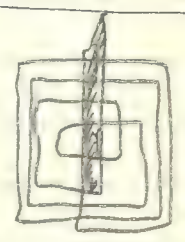
Trump Shuttle 99.-

Taxi Bos 10.50 ✓

159-

11/7 w/ Laurie Δ channels: strategic end user; oem (HW Vendor); Govt. rel.

Unix prob. 1. No channel. 2. Mag. App's.



Mike Defazio, ATT, Larry Dooley

Jack Scanlon

Bell Labs, Marcus Xerox.

Bob Kaiser.

12/18(2~6)

12/19 800 → 35p → ~ +/vik.

1/2 Moto, visit 4 hr.

1/3 Dec Strat. 2 hr., 1/16 - 1 hr

1/16 ~ 1/19. Wang visit 6 hr; 4 hr. Dec Strat.

1/31 - 1/2 d ibm.

Rosin

Curt Wozniak

Matt Perez, graphics

3rd party acq. (former Sahara)

Δ/? - 2 day BOD

3/21 - 1 hr

Motorola who to get:

Generic
- Ingress, ✓Oracle, ✓Informix, Sybase?,
- ? 3com/Novell? →
- ✓Lotus + WordPerfect
- ✓Frame = hi quality editor
- ✓Island graphics ≡ Draws.
- Southern Cal. → Retix X400 mail.

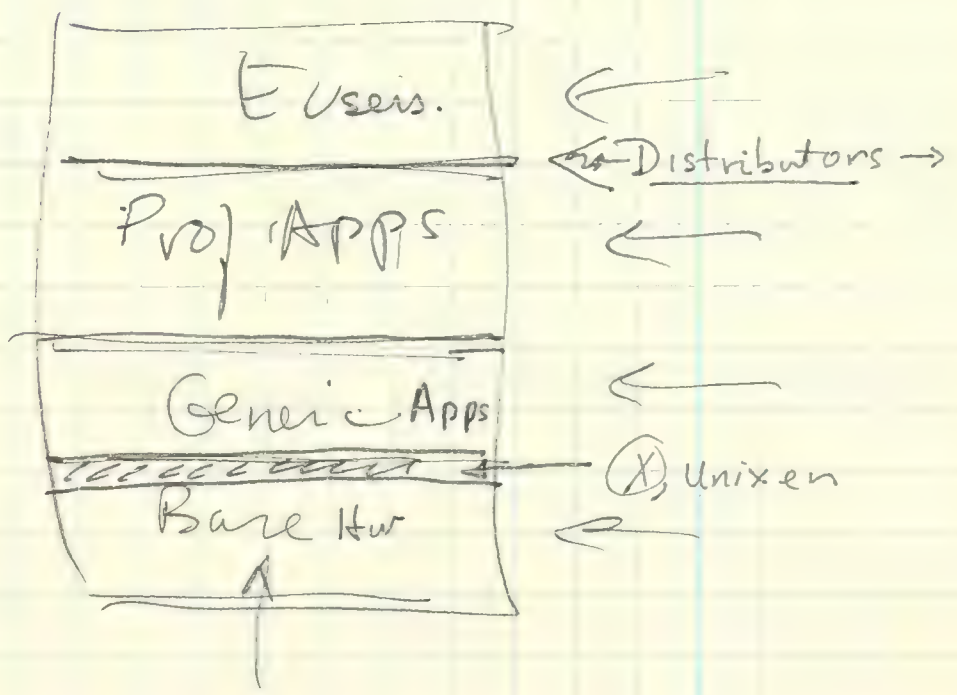
Apps - Si Compiler, Mentor, Gensym

4 layers Platforms = att/sun; OSF

- 3rd party consortia:

→ Univercities = X-open - MIT.

- End users



V

NET Frame

9/27/84 Netframe
. Grow Mkt.
. Great Tech
. Excellent Dist.

Partner (Pres. Enzo ~~Enrico~~ Terezzi, former Bussmann Land
Nov 82 Bismarck Grand
88 "$1.1B
Dave Norman
. 8-10% of the nodes
-30 Servers

Mkt
- 165 PC's/MAC. bought.

'60 – MF
'70 – Mini
'80 – PC (and w/s)
'90 – Net C.

– Dos/os/2
– MAC
– UNIX.

Servers: – file – enable user to share (files, printers) ~ 200K

(start next year) Communication – mangers the links.
(start in a few yrs) Applications – Compute solns – (~ Manufacturing)
grow 50 ~ 200K

Customers: what do you want ? . Peace of mind
. Freedom of choice
. Power with Simplicity
} at site price

M/M
Reliability, data integ.

(US)

PC
ease of use,

Carlton 3 years ago "true Server" tech. (Clm+CTO)

NF100 –

300/400
6 GBy
64 MB
8 Land
1200 watts.

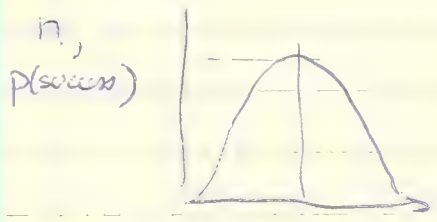
PC-Server compatible from

1463 Center Pointe Dr Capitol / Montpelier

Cirrus Logic Mike [illegible] 945-8302 Fax 243-5682

Mike Hackworth, Suhas Patil, Kenyon Mei (V Pres) former Intel

Too many resources hurt



→ Keep design groups small. Brook's Law, Q: η, communication, attitude.
→ Too many people will design / include too much make it inelegant + large
– Bureaucracy has to set in. Stifles Creativity!
= The more peo

Company saves the badges! Sports: I don't do R+D, I get from FC!

A successful mtg

starts & finishes on time.
involves all the participants – and only the correct participants
is driven by a chairman/manager
Differentiates items for info. for discussion or for decision
Records the conclusions, readers and actions items delayed

Technology can thwart 386/486 monopoly.

11/16 Univ. chip 9/1/80
360K at Univ. + 90K loan.

w/ Jim Guzy, Sod; Mike Hackworth.

– KSR → Low vol., hi perf.
– Graphics → high perf. → leads to leading edge stds., prod.
→ CDC →
fddi →

Domains: disks, graphics controllers,
people get very deep... world class, talk the language of disks / sys. suppliers

At founding: NOT a service business
Must add intellectual value

System suppliers act to kill their suppliers!

1. Tools → yields density / speed.
2. Calibration of factory w/ tools; on multiple fabs. (2nd source)
3. Skills: Domain.

~~add pgmrs~~ Custom: 200Kt

COMMERCIAL
MULTI PROCESSORS
? IBM 3090
* SEQUENT * FIREFLY
* ARDENT
* UNISYS
* BULCORE
* STRATUS
? NEXT RANDOM
? CRAY X
? CONVEX
* ALLIANT
* SGI

HIGH RELIABILITY

COMMISION STRATUS

PAPERS FROM SIGWORK ON FAULT TOLERANCE

Strat Wilkes VOS Reader a paper

WRITING PROGRAMS

LANGUAGE NOTATION

ANDERSON IN COMPUTING SURVEY

MICROTASKING MULTITASKING

COMPILER

KUCK

ALLEN KENNEDY

& VECTORIZING

OS

MACH

DEBUGGERS/PROFILERS

[BIBLIOGRAPHY?]

ENVIORNMENT

LINDA

FUTURE [EASY TO GET PAPERS]

* KSR

Tera

E/S

BBN

Papers

- Strecker - Perf. of proc/memories with i/o & ∞ switch capacity
- Bell/Wulf - C.mmp. Outlines ~~many~~ all the issues we could think of at the time. + 16 Fra.
- Bell - Multimax; Titan: ____ ; Alliant
- Bell - Multis
- ? Cache snoopers/protocols. Lows Baer, Goodman
- ? Stratus or new Tandem.
- Supers: a paper by Cray and/or Convex. "Plumbing paper.
- On switching - generally.

lots of papers on:

- Cedar (Fetch-add - RP3)
- Denneleor/HEP and its successor
- Cm*; C.mmp.

"Protos" all "non-machis"

- Aerospace.

Papers to write

→ BBN → new successor?

IBM Results

Any of ~~Kaye~~ new: BBN, E/S, KSR

INTRO: WHY? [EASY TO WRITE]

BELL - MULTI

BELL/WOLF C.mmp.

PERF: [MOTIVATED TO WRITE] [NOT EASY, MOTIVATION]

PITFALLS & FALLACIES

TAKE PIECES OF PAPERS ← AMDAHL

← LEHMAN'S PAPER [BELLEVUE]

+Dongarra +MacMahon → vectors arch. stuff

"Scale" issue

C16 ≤16 BBM

bus, x-point; m-stage; hierarchy

PMS

STRECKER -

SURVEY ON SWITCHING

MAINTAINING COHERENCE [EASY TO FIND]

ARCHIBALD & BAER

OTHERS

· startup/locality.

IMPLEMENTATION ARDENT MACHINE BUS PROTOCOL

TAKE PIECES OF PAPERS ON COMMERCIAL MACHINES [MANUALS]

CONVEX C2, CRAY X, CRAY Y MANUALS?

ISA: ORIGINAL PAPER CLASSICAL PAPERS BY CONWAY

Synch. papers - Dijkstra?

Harvey + Degnan P^2 for S/C McG H $\frac{1}{88}$
L D Polychronopoulos P^2_{prog} + Corsinders
K Lower Academ Pub. 88

Dec 9000.

	P3	780	9000/1P
KDhrys	51 (28)	1.76	} x30
MW	19 - 35sp (27)	1.3 (sp)	
L[m]	4.5 (28)	.16	
Linpeak	80	—	80
Linpeak	4.5 (15) 80	.12	18
Peak Vector	32; 128	~~[illegible]~~	125
Prem			1.24
FCS	Q2 90.		

Clock. (32x4 ~~64~~ 128 Mhz) 62MHz

4CPU + 64M = 175

2cpu + 128M = 80 + 3x30 = 170. +30 for graphics

1.24 > 7

170

10/31/89 Paper for CMU 25th "Why I Persist in Believing in mP's"

- The bet... and why I'll win. vs mP/mC.
- Machines I know: 6/10; 780/82, C.mmp, Cm*, 11/74, Hydra; big VAX mP, 11/05 mP, 8
  Multimax and Ultramax; Titan / Stiletto.

~~what they showed: Elxsi - get more work done, fast context switch.~~

Others: RP, Butterfly I + II, Monarch. Cedar,

~~Measures are critical: don't know how.~~

other multis:
the big, littles ibm's, Japanese machines
the supers: b/w is the issue Cray + Convex
~~Others: KSR; E+S;~~
VMS: in them, but no machine to execute impossible after Cutler.
People: Rodgers, Moore (74)
Sites' argument?

Measurement tyraid for universities and parallelism:

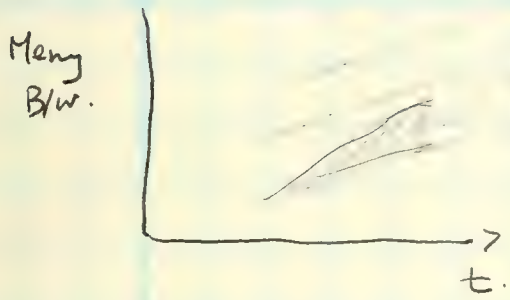
1. use clock vs ref. for parallelism, not time. No university machine ever corrupt
2. Mix technologies aka Cedar are unreachable
3. Critical, slow parts (eg. FP) enable more parallelism. Build, true scale Models.
4. Don't neglect anything.

5. Four degrees enable speedups
6. Mixing too in Kung

1. What we thought about on C.mmp and what was learned, Strecker's thesis
2.

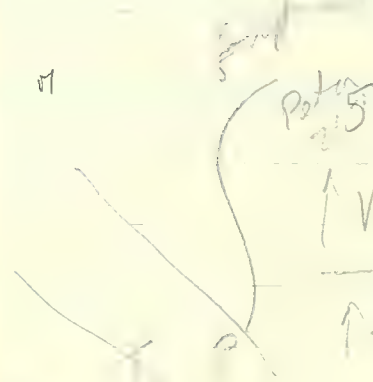
Measures and design space not understood.

1. [illegible] with dim. Hoard, Multimax
2. Scale is critical for parallel and large vector SIMD's
3. Throughput vs capacity


Mem
B/w.
t.

- Send DP Comm's Papers
- Randy: Compilers Papers? Class Applic. Papers?
- Straus: Gardner.
- papers: BBN, E+S, KSR.

Mem:
PMS
Cache
Sync.
Compiler
algo.
B/M workload



→ what are

that led to

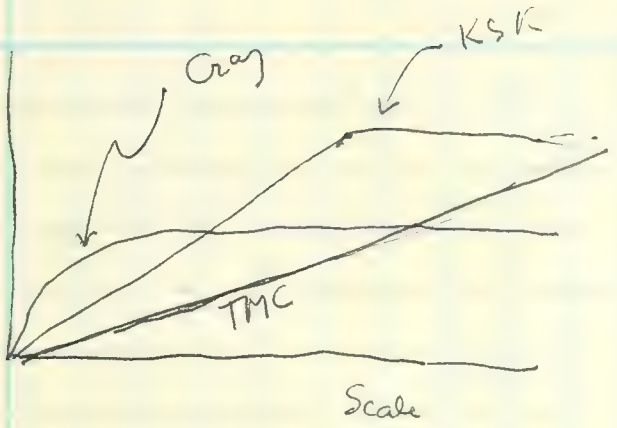
1. Dist sys.

Clock cycle

- 8080 / 86 etc.
- 720 200 → 16

3.

— dynamic



Taxonomy - Central vs dist ① ② Smo. vs MIMD ③

get confused with Butterfly.

Impossible to build a central shared memory: - No Scalability!

Paper 6/19/90
The elimination of Mp. Key to Scalability ← eliminates hot spots. less traffic. Eliminates write back.
Questions: How do you find Mp?

Ideas: Scalability, memory centered design, all cache ⇒ no Mp,
Persistence

50x Cray 1 BW

Cray yarp ~~4~~ 6 no. 30x Cray 1

1 x 8 x

M_P

$P_C :=$ ⇄ $M_M(8\times64\times64)$ ⇄ $D +/-$, logic x2, pop

→ D_{fp} (+/-, * 1/V

M_S (8x64) → D_{scalar} (+-

M_A

M_P ⇄ (32MW) P_V (4 ports/proc)

ϕ_{GXP}

1,000 Mb4/s M_{SSD} (128 ~ 512 MW)

~~4 ports~~

proc = 3/4 ports = $\frac{3}{6}$ x 8 = 4 Gigaaccesses/sec for all 8 Pc

Henry = 256 banks @ $\frac{1}{30ns}$ = 8,~~533~~. Maps

Cray

Cluj 2

195Kw, 5500#, 16# 45"; dia = 53"

128 banks; 2Mw/bank; 1 Gw/s

12/4/89 Technologies

Home

Discontinuity

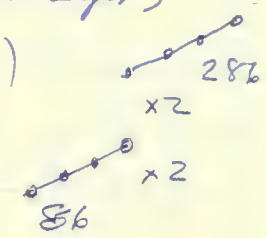
1 Perf.
2 Integ.
3. HI.

Moore (Doubles every 18 mos)

786 - 10M - 2000
486 - 1.2M
860 1.0M.
586 86 - 10M
686

Each u doubles in
x a 4 year w. evol.
x doubles evol.
(doubles in 2 years

386 - 16 → 33
~~486~~ - 25 + nt20
(50Mhz in 2 yrs)



Opportunities
Replace
W/S
Compute/File Sv
Mini
SM
Mainfm

Human int.
Not yet discovd.

PC = 84
170 + Meg
70+ meg.
10+
~~1992~~ 2001

PC integration
Bus, graphs, modem, audio, video, speech.

Cray	10	Sell	Touch	
Stardent	100	&	Power	Focus (Power) Power
Ibm	1000			
Minis	10^4 SUN			
PowerPC	10^5 Compaq			
PC	10^6 Apple, Ibm		Power	Ease of use

82 - ibm - 552

Jobs 85 - Desktop C
90 - Net, groupware, filesh. E-Mail
paperless, connectivity,
Interpersonal C

	Power
W/S	Next
PC	Mac

Ease of use

Lan, 32, Gui, disk, speed

Port
Mo ~~Hard disk~~

HH.

t.

more integration

PO Quest

81 Desktop
82 Transportable
84 Lunchbox
86 Laptop
88 Notebook
89 Portable

Replace ~~Desk~~
- Laptop
- Notebook.

New
Wristwatch
Embedded
NY Discuss

HI
TT, Video, PC bat, PC Graph, PC-M², PC_motion video

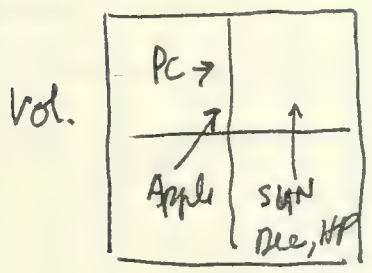
Replace HI
PC, W/S, Games, Apps.

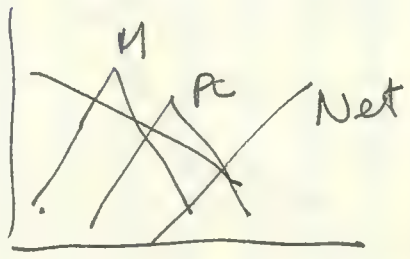
New
pt of sales, Trans, Train, NYD

1990 Disc,
Ref, Integ, HI

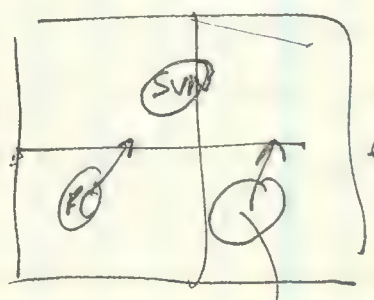
F200.
1.8B, 200K seats, 3/4 Sparc 100K rate, 90% new products

McNeely





Power.



ease of use

10. invest. By July 1, 1990.

1 - Client - Server
2 - Risc
3 - unix + Db - ~~RTI~~, Sybase, Oracle, ? ~~Relational~~; Informix Ingress
4 - Ease of use - Easy desk.
5 - Net. / Connectivity
6 - Graphics, ... mm.
7 - Multi-billion $, multi national → 50% international.
8 Open Compatible = Binary Compatible (DEC + MIPS), not cloneable.
9 Appl. SW → Volume.
10 Volume Scalability → Dec Server → Desktop
(Style)

Learn.

12/7/89

E+S

8(x16): ES1 3yrs. ago. 6 chips: Calib, SC wafer probe, dvt, pack tech.
(chip → chipset → arch level → software.) Sim
5/86 approv, 12/86 operat., 5/87 1st chips tape 8/88 - 1st
1/89 - op. 4/89 - opened 5/89 - 1 cabinet 6/89 6/89 announce
9/89 - 8 .. 11/89 - shut down.

Genesil: Worked well Foundries a prob. Calib. ourselves.
Could go to best foundry quickly. Good timing analysis.
25 MHz. Superior to Gate arrays. VTI. 100 kg.

Hierarchical X-bar.

800 ~ 3600 Mb/s. 16 ports;
2(2x100) = FDuplex / port

20 ticks / second
x pt
2½ ticks / x-pt
= 4 messages.

Proc. = 16 Pc + 128 ~ 256 MB
64 w interleave. @ 800 Mbytes/s.
32 byte inter
Xpt = 1.6 Gb/s;

Queues on either sides of Xpt. TAG Request

ISA - cached / uncached access
Latency: 25 ~ N; Fill: 4 or 32 bytes Variable ld/st
each cost 1 ~ 8, 32 bit words; 1 CPI

1 ~ 8 P.O / processor each @ 25 Mby/VME

Dhrystone: ~ 10 ↔ ? didn't know
Whetstone: ~ 5 ↔ ? " "
→ HPM 1 Cu 1.5
Linpack 1 Cu 10 (x 1000) ← changed algo. + size.

7.5 x 10^6 gate; 256 Mb in 2.2 ft^3; 0.8 μ
340 pins, 25 mil pin pitch

8 x (16 x 8)
↑ L mP
mC

Perf. ~~Linpack~~ Parallel Sort, 8 cu.; integers

20K - Ivan, (Synthesis)

Logic effort = Electrical Effort

Gain. = $\frac{C_{drive}}{C_{input\ togate}}$ Normalized to an inv

	inverter	= 1
2i	nand nor	= 3
		8
Xor		
Mux		4

How much worse the logic gate is than an inverter.

1. Current topology = Width vs length.
2. Tells the optimizer (a priori)

Cirrus

1/10/90

1/9 - offer board. Replace 2VC.

- 1 every + 1 day BOD mtg. in Milpitas. → _____ Other time $? =
- Director's Insurance ? =
- Responsibilities:

3/20/90

Intel

- speech →
- dvi / m² → C³ & Intel
- Fax →
- Comm
- Graphics + Images
  cellular, tablet

- wall mount
- desk side
- desktop
- portable
- laptop
- notebook
- pocket
- pencil
- wallet

3/21 ~~[illegible]~~

3:30 - 12:00 Iran BOD Dinner

3/22 8:30 - 5:00 BOD

Transportable → Portable Desktop 18# → 12#
laptop → Notebook 10 → 3
Notebook → Pocket 1.

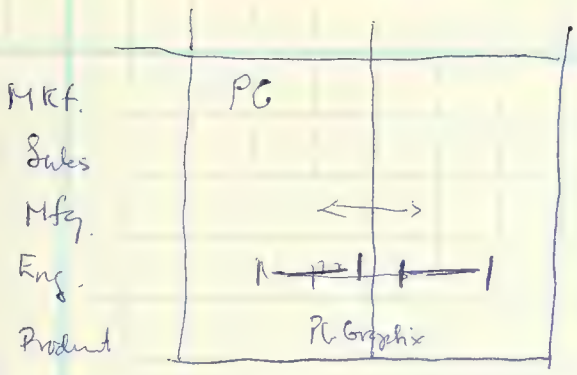
Comdex Meeting re 8/1 1/2 day re. Consult on the "Conner Problem"
8/8 1/4 day Weitek

Weitek Life ~ ibm = 24 mos , Cirrus 2-3 yrs
100 Mflop chip ; 64 registers

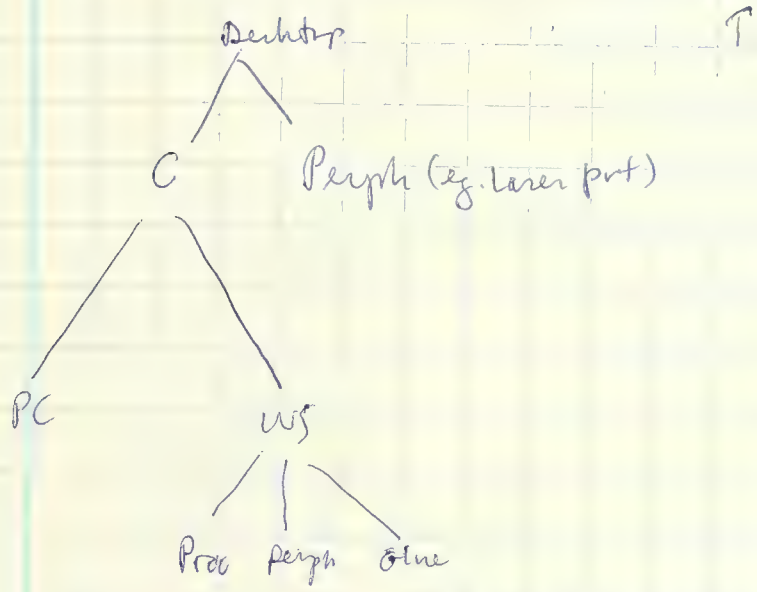
20 + · S/C - TMC → FP (→ 100 Mflops)
15 · W/S Graphics - ibm, dec, sgi → uproc.
whole, ← 45 · W/S Co-processor - 386 486 Sparc 1, 2, HP, Motorola (68k)
15? · PC Co-proc → (50% - 100%) ← ½ of them business > 10K/mos = 120K/yr.
Cloned by TI, LSI Logic
89 99 91 5↑
49 64 ? 100%
extends to dec, uprocessors, Si in fabs,
SPARC

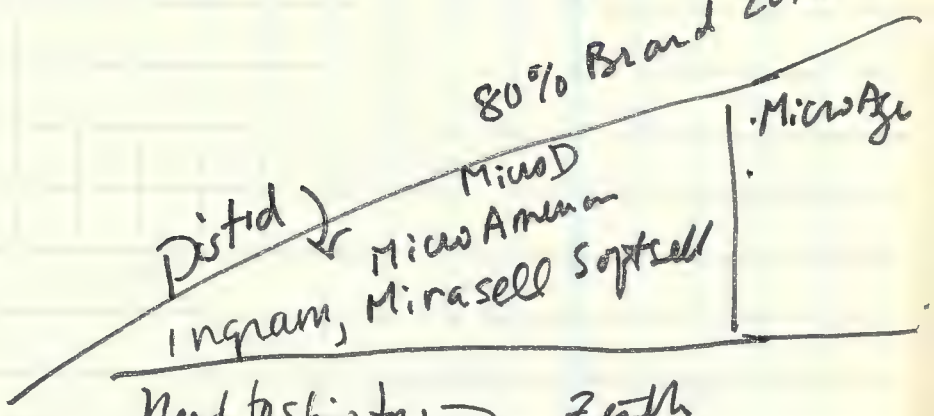
Also kinda "out of catalog" MIPS chips - (SGI, Dec)
Move into Risc up area.

Dec - 25K, Sparcstat 150K, SGI ~ 3K/month → 38K
Risc will be a commodity.



Weitek Consulty
8/1 – ½d, Conner
8/8 – ¼d Weitek





1/14/91 – Paul Jain Media Vision: MKting @ Compaq, ibm, nec, ... att, Tandy, ncr, Compu Add.

Digital Audio
MIDI
Super VGA
Video

Q1.5 Pro Audio
Multimedia
Pro Video Spec
Audio Chip set

Sound Blaster
Games
Desktop Edu Pres. Enrich Train Video Conf POS Entertain

— W 3.0 —

Audio
Video + Graphics (Ovi, Pro.V.)
JPEG/ MPEG.

Compact Cost
68 Act. 36 15
272 passive, 170 70
160
March June Nov
← $350 list $95

* 1st product to meet MSoft, Spec.
Buy first & meet.

~~12/31~~
– 16 people
– $1.5M.

91 – 12
92 35
93 60M

1. >40% GM
2. Op. exp. < 20%
3. Strat. Alliance w/ Supplier
4. Sub-contract mfg.
5. Cost Red.
6. Inv Control

1/15/90 (Seal)

Hypers:

- Paper – price/mips
- Cache hit rates
- perf/benchmk targets
- SR art.

Charles C. Francisco geo
500 Exec. Blvd
Elmsford NY 10523
Fax 914-592-1732
592-1190

Switch – 2 Gb/s → 256 Mby/s → ~~64~~ Maps (32bits).

32 → 128 → 1K points.

2^{13} 2^{15} 2^{18}

smallest mcp/port = 2 chips/Mbyte x
= 8 chips = 32 w
= 32 Mbytes
x 32
1 Gbyte.

Bytes 8 Gbyt/ 32 Gby/s 256 Gby/s. per port

64 bits : 1 Gaps → 4 Ga. → 32 Gaps.

Switch alternatives

1. HSC ⇒ HPPI
2. Seal Communism aka Comm.
3. Multicomputer switch ~~H→Serial~~ Parallel/Seal
4. 32×32 P/M. RISC

Big Uniprocessor.

1 Gbyte 2^{30} — 150

x64

16 Mbyte 2^{24} — 20ns

64 ~~x16~~

256 Kbyte 2^{18} — 10 ns

16

16K -2^{14} — 1-2 ns.

(1~2 Gaps

Pc

Student:

Chen → '93

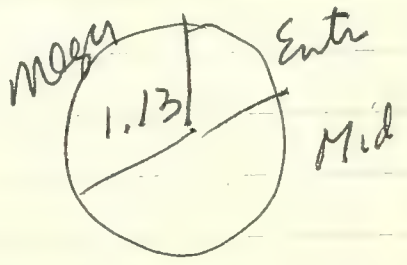
Gray Smaby 1/16/90 KSR — Cray Computer Corp (3C)

120K□, 60 acre, owned, PCB 3/90; 6-10 C's/yr.; 3-3.5 M/M burn., 120M +
Expect NO additional capital., 257 ~ 275 p.
proto: 2 proc. Q390 summer. Open to outside collab early '91, 16P
if proto
Scalar 2 proc/week; No absolute shoe
GaAs, Repair, Viable Mfg.
20 ~ 25 tested. 12/4 connected 2 modules;
'91 → $350M — 10 Machines. 38 prospects visits; 50 visits
25 Cray 2's $60M val @ 3.
480 ckt types
Rockwell
Gigabit
Fujitsu
Microsystems
Perf. Semi
16 (16 chips/board) /module 12K connects/module
208 modules/16P
(12x Scalar; 8x Vector) Cry 2
512Mw, 2ns; 25ns access, 30 clock/bank ?
16 Gflops, 4 GB/s i/o
[Cray 4, 1991 = 96x Scalar, 64x Vector, 1ns.; 2 Gw, 20ns a
8 Gbits/s; 128 Gf
New base; V.4, Mach → follow standards.
Connect all Cray 2 dis
IMPRIMIS arrays
15 SW → 25
50 adm.
63 HW
85 Eng.
55 Ckt producers
25. PCB "
Go Diagnosis online, Low maint.

$150M in assets

Smaby "No better Venture Capital than this one!"
15 Msh; 80% will go to 14

Mag 15
10-15
Thin 4-10
1-4
500-1M
Early 100-500
25-100K



Cheu – 94 likely 93 Beta O(200p) →

Cray
- Progress reports 5.M from NSA Taiwan may invest in Cheu
- Deposit 5.5M eqpt, Closing equity from Ford, Boeing,
- 16 proc

$25M for 35% in kind. ibm.

Optimization MKt → financial models, utilities, airlines, Xportation
↳ Going for W/S. Increasing demand

CDC introducing fast MIPS box (4000), aggressive ($800M Computer, $350M Govt. $850M Service
↳ arbitrage Violations)
$5B → $2B now
1989 write-off $676M VTC etal
add value to quasi-commodity hdw.
O(B/B) for plato.

CRI → Super squeeze aware. Aggressively addressing both ends.
Group addressing larger arrays. Tony Vacca.
Cray arch in chip set?
C-90 → Proto 90, (92-FCS) YMP 8 NOV.88 XMP-

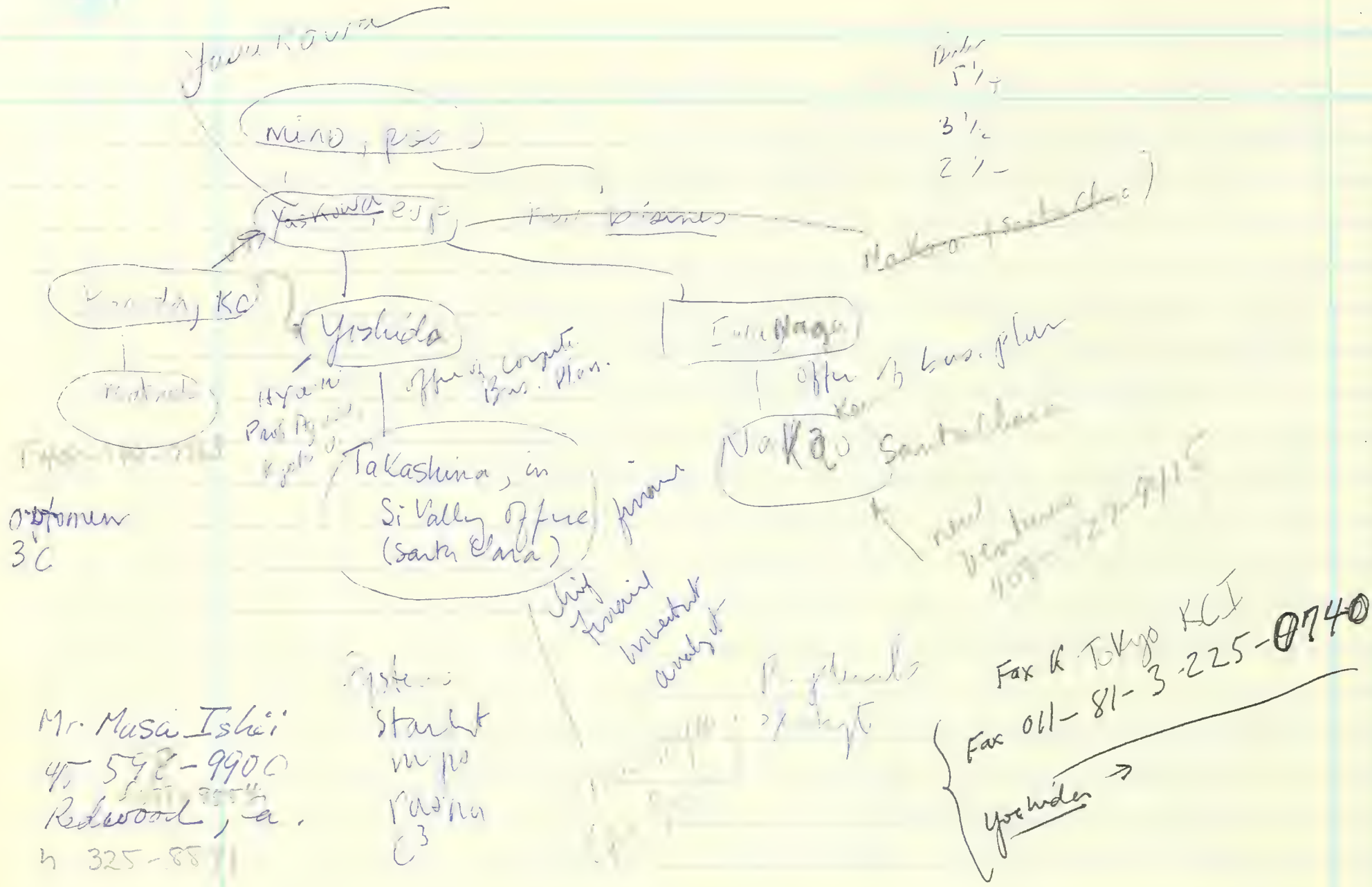
Convex: (16-17ns) — 2½ C-3 intro Summer, Q191. 4.5x
(1:8) Processors – some GaAs.
56 x 2½ = 125 x 8 PK

Petroleum: modeling, Seismic — COGNISEISMIC, Pat Poe, Pres.
½/Gflop.

Alliant 1/22. Multiflow ECL → M

9000 No Beta yet.

Summit 20%, 12 pro


Yasukawa
Mino, Pres.
Yasukawa, e.v.p.
Yoshida
Takashima, in Si Valley Office (Santa Clara)
Nakao Santa Clara
Mr. Musa Ishii
Redwood, Ca.
Fax K. Tokyo KCI
Fax 011-81-3-225-0740
provider
→ Ken Nakao
2880 Lakeside
Suite 131
Santa Clara 95054

Visix 4/5/90 RS mtg.

Net burn ~ 100~125K./mo.

1 — +

Paul Stephenson.

⇒ mips; moto.

⇒ kubota, ~~xerox~~ (Velox BOD), goldstar

⇒ Lotus; warnock;

⇒

*Raise $ when you don't need it.

*Marquardt raised $1m! for msoft. News spent it.
$3M

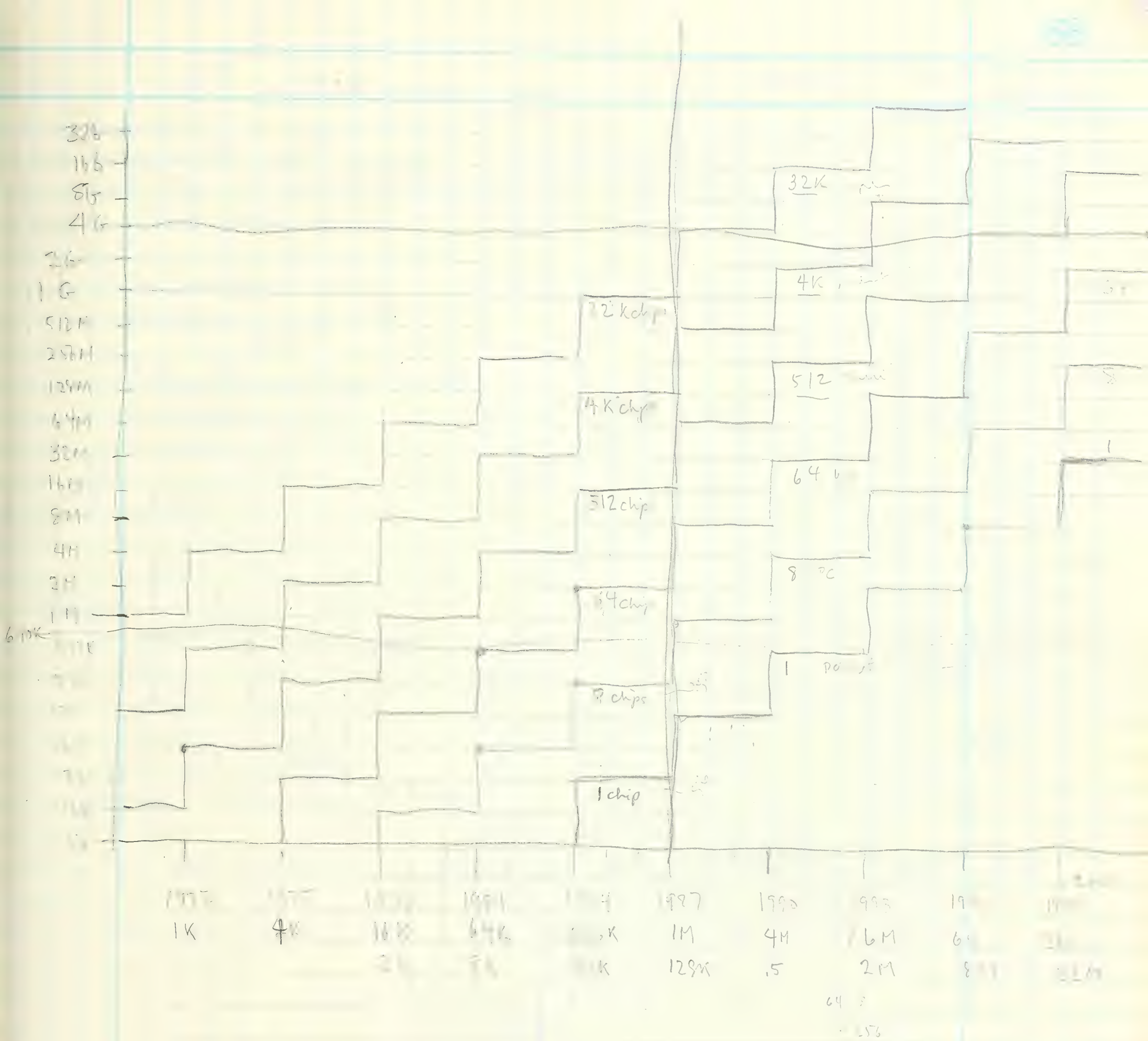
• Oak → Dave Best ($. intergraph, 3M ⇒ now.

→ Kubota
→ MIPS
→ Lotus
~(?) - X Japan

Seed capital - intergraph, pyramid, stardent, moto, DG.
1.7, 4.7, 8.5 10.2 = 25 M.

→ + ~~15.6~~ 82 M

nca dec unisys


32K
4K
512
64
8
1
22 Kchip
4K chip
512 chip
64 chip
9 chips
1 chip
1K
4K
1M
4M
16M
2M

Arstech 4/9

Comm.

isdn
std comm ^
CAN - Enet, ibus, etc.

Fax.

image,
graphics
m²

Graphics

cpu
mP
vector
bus interface

Disk

292,456 x .3 = 87,736/3 = $29K ⇒ $4.7M raised

Eig → 5.8K bought

$ Seach

$1, 8.6K → 3M raised

$5/share

9/29/81 – Bill Avery, Charles Manias, P.Y. Chen, Dan Ford

Scalable mP using Workstations or PCs + 1 Gb/s slotted token ring
to be a coherent memory (use Galeb co-Augment)

apps: File, dB server

6-mos demo
12-15 mos – n units

need 10p in Q1, Q2 = 18, 2yr 35p.

Advice: ① strategic partner

Partner
- { usoft invest – Nathan, Dan Corbin
- { Intel – Yen, Wirth, Vadez, Gill
- ibm
- Sun
- ~~dec~~ – unreliable
- ~~Sgi~~ – will steal idea
- ~~CDC~~ – no $
- ~~Wang~~ – ..
- NCR – NIH
- HP – no reason?

2. What is the cheapest way to do this? Can you self fund?

advice, Give me stock, see Korbotta (Taiwan)

6/12 - Slate - BBN - Herb Lisson ⇒ Groupware → Old Diamond

- OA, El Publ., Mail, Teleconferencing.

M.M = Σ text, SS, charts, speech, B/W, color photo, graphics.

Media Editors = TEXT; McDraw Clone; Voice editor

Structured Doc's.

new way. → Multiple Languages,
TABLE Wake → not programs
(Templates) ⇒ Site specific, etc.

~~Elec. Mail, Filing~~,

5/4/89

Tight coupled mP

- 6 Shared mem
- 0 Quad - ipc - named, Queues
- 1 Semaphore - named space.

Don't take mC into account!

U.4. 24 man weeks → 12 weeks; 2 people

Quickturn → not full simulation

14 months → mips R4000 in 10/90.

Verilog ↔ Synopsis

Pixar

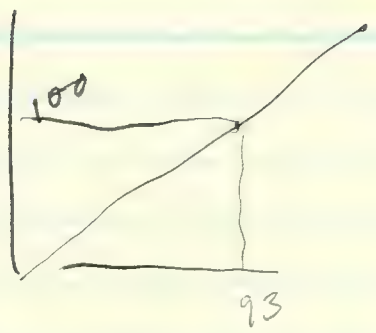
Visix wsi

6/15 - Intel

486 etc. John Crawford

Integer Spec 1.7x/yr. to Jan. 95

PJ → 92



100 integer Spec in 92 for MIPS, 93 for PJ

		cpi
Intergraph 89	486	1.8
(92)	586	1
94	686	.7
96	786	.55
84	286	6
86	386	4.8

4x10^6 t/chip

88 — N10 — cache

90 — N11 → tape out 9/91

92 — N12 → 66 Mhz (modules)

	VAX mips (780)		
88	860 - 27 mips	- 20 spec	- 53
89	32		40
90	41.		50
90 N11	54 (40 spec)		50. Samples in
	66?		66
mid 92 N12	66/100		66 → 80 Mhz ← cpi .5
End 93 N13? (64bit)			120-132 Mhz - 93

N12

fix 4 in/clock 6 ops/clock 4 inst/clock.

mes. Exec loop across pounded.

Comm - 2 levels — task +

net { 2.5M - 91; 4M - 92; 12M - 93; 30M - 96

Hunter. Insignia

Standit

C5 - Q191 "

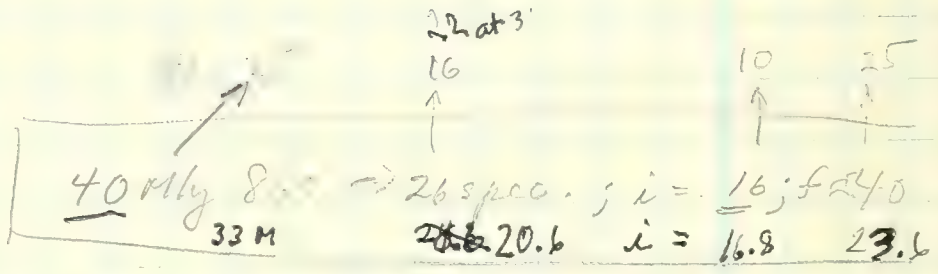
C8/ "

Proposal

- Pat 860; x86

- Addressing

	9/89 860 @ 25M	6/89 486 @ 25	Σ 25Mhz Mips 3K
i	10	13.3	19
f	25	6.6	17
spec	16	8.8	
mips	27	15	
LP			



- Convergence of architectures:
- Addressing
- mP

N - alliant,

Some Questions to answers 2/3, 9:15 (D. Wolf mtg.)

→ 1. what is the performance story of the various machines vs time (Intel, MIPS, ?)
2. what could a >P6 ,>N12 look like if they're made to converge?
3. Can you converge the Arch? Should you? What is a post load possibility
a. Show the taxing of "twin" structure progrm models.
4. Why are the machines so slow when Intel uses so much Silicon ? compilers ? arch.
5. Why not build a real mP ? (avoid special P's, use MIPS)
(a) What are the possible designs ? (ie. mkt segs by C. clus, i.e. bus kr.
See Ed de Waith re. market #'s, etc
6. What is a 64 bit arch, What would you do if you could start over?
7. What does organization look like ? Why Pat day must shut?
8. ABI: Generic = commands that must be support, proc. specific — how carried out — arch usage, reg. usage, parameter, stack frame (alliant, Sequent, HP, Dec for N) status
Compiler Binary portability: - XA - probs. write order, synchronize; DP alignment
Adamt. Alignment of dp problem. Many consistency problem
→ Write a simple goals! Paper for Unix & funds, OS, and Convergence ?
9. Need to look at VEA limits; Windows Accelerator, etc
10 Work with Weitek! Big Reg. files, many ports,
11. What about a W/S?
12 - Is Intel the high cost mfg?
13 - What about compression?
14. Organization Get rid of Tab - wins Cirrus, Weitek ⇔ intel, idt, Dec, Sequent, Cypress, Fuji
15. Steer Customer base talk but no Action
16 W/S — Cost

Standard : VII - cheap vs a VII - Futurebus.

Basilli

Software Cafe.

J 20-50 Executable lines of code/d.
US 10-25 ..
J 100K

J. 008 E/KSLOC } Rel.
US 1 to 3

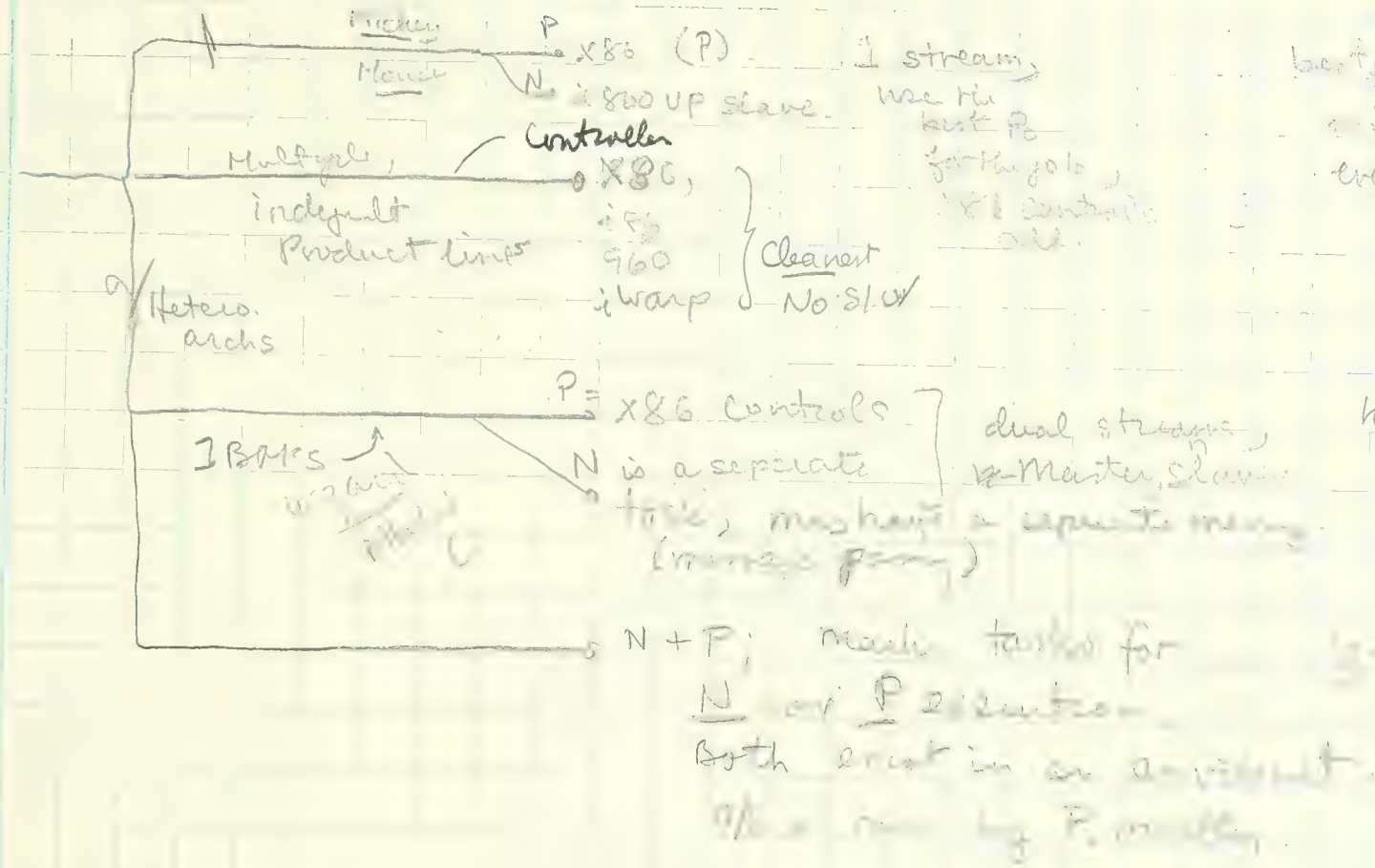
X/O more Quad. } IBM & US ESJ.
½ product

Belady → ATR (Transfer bank to develop't / Research. (extends Resources Ph D. thesis)
J has goal. J = Goal oriented.

Intel time / $'s

Friday 8/3 - ½ day

Intel 3/5



Mini ssuper
Graphics
XA
PC+ (msoft)
Server (

Personal S/C

Folsum PEG Mkt. Erez Carmel. → Product Definition: chipset, highly integrated &
Intel's EISA-chipset; mP chipset; Guidelines to support both in 1 system. PAC = rescend;
Tradeoff: Complete Soln to customers not sophisticated, example systems, Healthnet;
Tiers: 1. Compaq, HP, ..., ibm, DEC. 2. less sophisticated 3. NO engineers.
Concerns about too high end a product, means lower
mP: Nicki Bodenkamp. (Gary Thomas) Personal View: High Vol. Mkt. – Low Eng.
mP-ready → 1 P_C + 1 (for 2 or for 4) Minimize Cost of mP ready, shift to upgrade.
Soln Stage: Knowledge X86., No exposure to NI, ~~not~~ to concern for NII too
NII Clear

Bryan Bennett 720-2966 - Sales
Jim Fluery - 524-7162 - Corporate
Chris Khan - 524-7191 - MKT

8/1/90 Mips →

(Winner) R6000 → FCS Q1, (1-2) ; Q2 - (10-25) in Poor chips ; Q3: < 100 ?

R4000 - Samples 1/1/91 → Tape out now → 50 Mhz + 4mos.

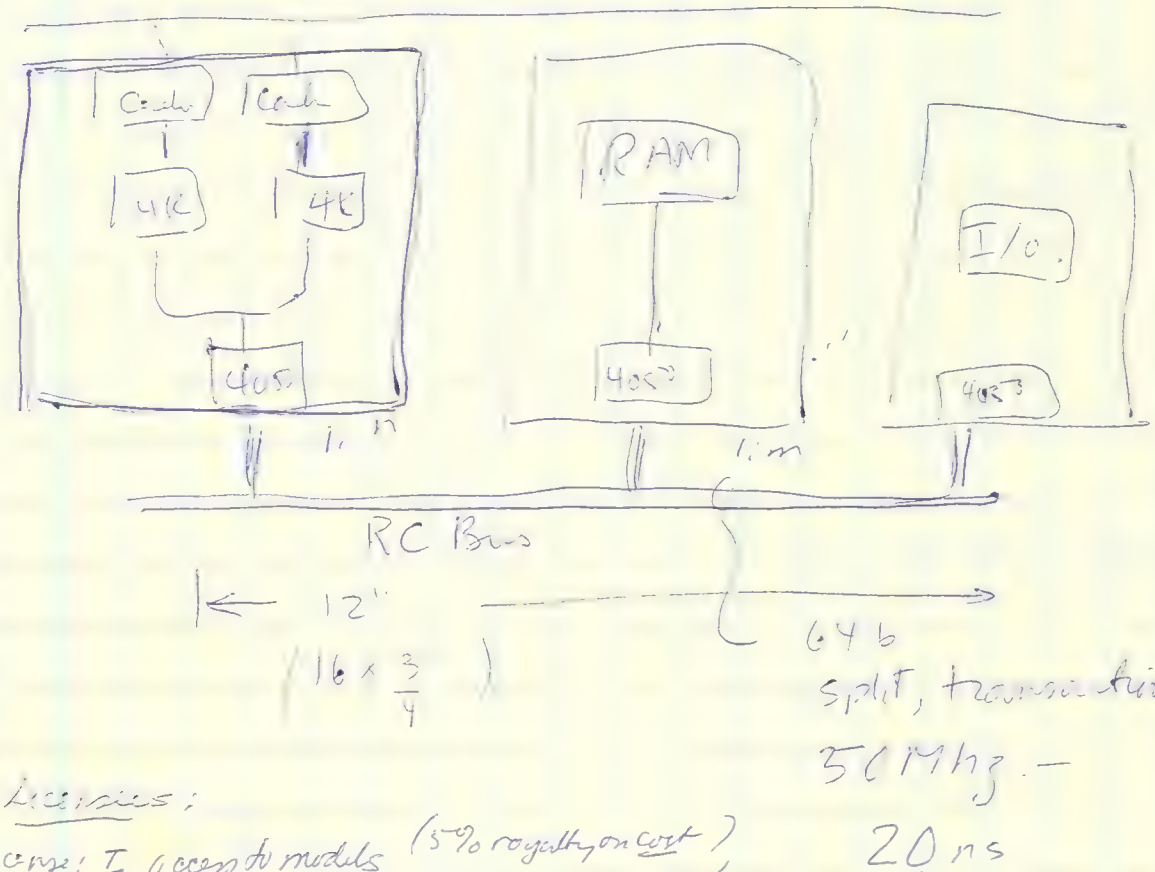
4050 ± 6 mos. - Coherency processor → 75 Mhz = 100 MAX Mips (sec. cache)

Kubota 3230 - W/S 50 Vax mips. + 1 year

→ Next machine ??? 6000? Coherency bus

- ibm?
- Mentor? Mostly update!

Q291 as per GSM 9/20



See Dr. Moon Skip Smith

50Mhz - = 400 Mbytes

20 ns

800 Mbytes → 10

10ns

Licenses:

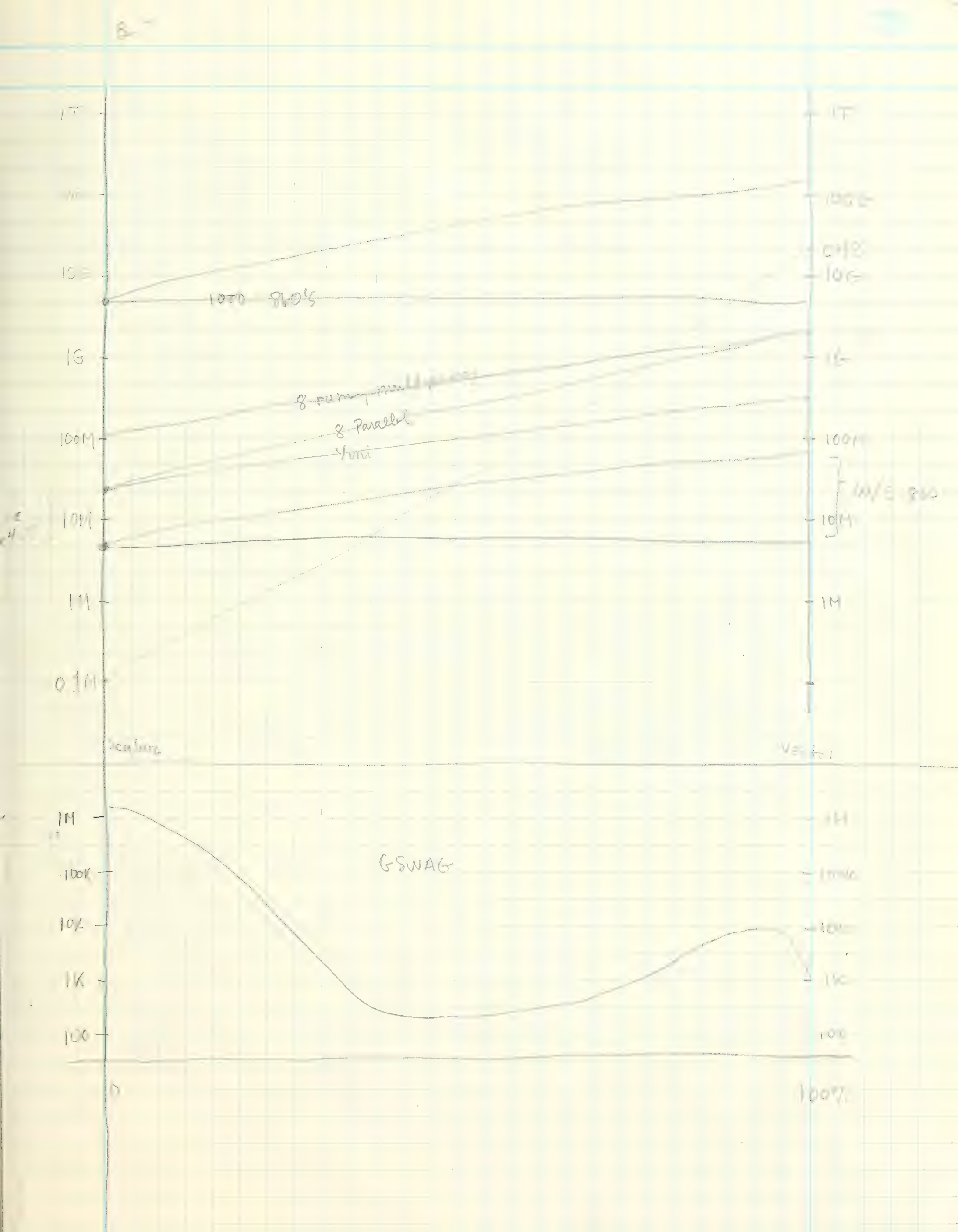
$ 1m License: 1. access to models (5% royalty on cost), Can't sell chips
2. Can sell other chips.

$ 8m 3. Series

50Mhz 4000 - 50 Vups, 150 PLP, 950K t

75" 6000 - 100 200 PLP

6000 55 Vups → 10 - Gigaflop in a Soup Can
→ Tera


1T
100G
10G
1G
100M
10M
1M
100K
10K
1K
100
10
1000 GWAG
8 Parallel
1 Unit
GSWAG

People

Frank Gill 5-696-7197 - System

Beatrice Fu - Compilers 54546

?

Graphix (Visix)

Work with DEC system to keep portables

after fighting N. stopped. No good X86 - SystemPRO is bad (assembler) ALR covered start to work. no doc. system

Cutler 10/14 N/O runs marginally. Not doing much work on it. Just here first early steps. VA (visit for N12 + details of heterogenous mP).

DOS, Windows - Segmented memory model vs. N11 (mixed, OS/2 V2 32bits + segments.

Not ~~in~~ insurmountable, understood how to do it.

- heterogeneous, mP system
- fair amount of work in the memory managent.
- don't want 2 page table formats

- Run 2 copies of some? O/S of OS (P/N)
- Mem model looks the same
- Make I/O drivers com to right processor.
- Full O/S — P; Shell on other processor.

- File could be executed on both types.
- Could be done. Needs to be thought through.
- 1 Boot architecture,
- Interrupts work the same

Principle: Don't listen to all users. Only the great ones.

Cutler

- NI2 - terrible. too many programming models. Never get right, NI a very exception.
- DEC is ~~[illegible]~~ [Strong order ?] → is strong ordered!] Cutler says including the 9K
- NII - Alliant Model. can "gang schedule"
- R4K ? →
- Keeps old pipeline → NIC mistake, get rid of programmer's crib. - 3 stage
→

Cache

→ Granularity of access must be byte! Given the old applications.
Disaster on alignment in NII. Integer x is bad! no ecce /, Recip
"NIC is just awful!" - NII fixes a few Mips caches,
Good Arch principles. Good tech-decisions doesn't come out

386 ↔ i860-25 Mhz. slower, due to context Switch in NIC fixed in NII
"Trap" handler in R3000 is 1/4 Size

① NIC - P.C. ; junked it. Runs Graphics well
② NII - not doing anything with it.
- MIPS 3K; Run MP platform - 486 Now.
- Spare. No Port might, but don't do it now

Very bad taste! Cache didn't work.
Hardware is never all fixed.

i860 was flushed since it was so bad.
Want a 486 mP Now! cleanest corollary based.

March is terrible! Dump it. Too many warts. Can't grow.
80960 - base is much better. Much better gp arch.

Don't have real Arch or Specs! 4 months. Cache worked.

Don Alpert. (Greg Files) → MIT
- ~~Sr Tech~~

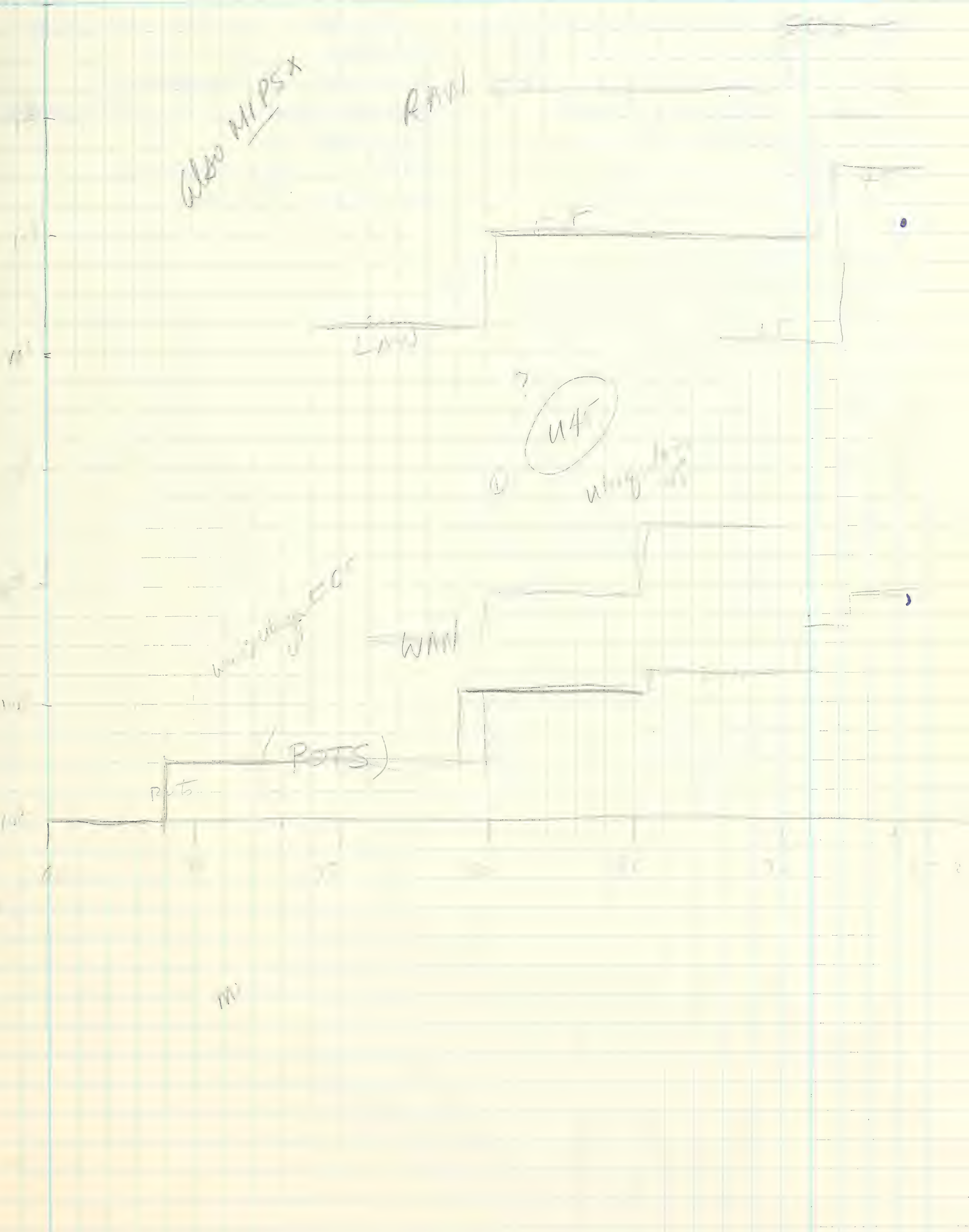
Intel is a technology company: Physical. Computer Co.
Critically lacking in a computer environment.
- Don't have the skills, people. for > 5 years Networks.

Kraele
Customer base: μSoft exp't., Spare., Intel control, dominance, Emotion in Customer base
MKt. Sags △

8/15/90 Gary Thomas ... -mP. Planning Overall.

c

- Mem bus control
- Dram control
- Bus Mux Mem
- I/O interupt. control
- ~~HSC~~ Memory bus → I/O


(100 MBPS)
RMI
LAN
WAN
(POTS)
Pots

Plan 4.

9/7/90 Dennis Ritchie

Bob Crowley 617-723-4920/F 723-5983
Hay Sato 617-439-5052/5090

ISDN everywhere in Japan (20 min)

Mfg: Crowley
→ A viewpoint from Asia: Entrepreneurial Climate
Consensus in NE.
{ + / −

- Environmental Determinism:
- Control orientation Way, DEC, Provincial
- H/S don't Mix
- MIT: / Industrial-Academic
- pairs all 12. B's or both.

intel. 10/8/90 Pat Gelsinger 503-696-5171

~~Appt.~~

~~Plan is only as good as the schedule.~~

~~Can you make a lower end product?~~

Yes x86 low power; get more of W/S mkt.

Alternatives:

- Kill 860 / let 860 stand alone — 387 on 20%
- (3) XA — P+N — 2 chips
- attached ? (vector unit)
- iWarp — multiple chips
- (2) x86+?? — extend x86 architecture — 1 chip

duo vs APX

P → P+N → pP+nN (p≥1) Symmetric (heterogeneous) mP

Jens Bodenkamp
Benny Mayhof (hd. 860 arch)
Dan Krell, MKt. Mgr i486

What are the applications? Who's

Defensive task for x86. → SOCKET APPROACH

- intel's "Risc" u.
- bolsters fp. perf
- We're losing.

Add N to P for Accel

Offensive

- use for fax modem.
- 3D graphics; color.
- JPEG / Image compression 10:1, → 100:1
- Image proc. applic.
- Low end animation
- DSP (eg. Next) for voice, fax,

Goals

- Desktop System ≤ 10K
  Outperform sparcstation
  Be Best of class ~ RS6000

Have a single Unix, single source tree.

Market initially: W/S
(not appropriate)

ideal: run any process, or a thread interchangeably on either

today APX supports 860 on:
statically. Runs Unix
now { · OS/2
· DOS
soon { · DOS/Windows

Ideal: dynamic assignment of tasks to p or n.
1 set of page tables, invalidate TLB,

We can't abandon 80, 860 customers outside of graphics

Applications: Have you ever seen a dead, no SW?

· GSM has many ideas re. getting perf!!

why add a sound chip? DSP, i860, or 68040 (Next)

---

start by Develop a secondary processor (second socket) → that develops over time to heterogeneous, symmetrical nP system

Move 860 program to an extend the 86 focus
improve FP perf.
improve long term integer perf.
setup a model to introduce a new 64-b arch

Obj:

	N10	Extend Add nFP	APX XA	DUO (Separate Thread XA
F.P. Perf.	higher 2	lower 1	highest 3	higher 3
Int. Perf	medium 3	medium 1	highest 3	lower 3
tt demo	years	years	now	soon
tt ship				
Customer upgrade?				

Tools dev. cost (cy, comp, OS libs)

Prog. model
Apparent CISC prog. Env

	← No N14/N15 (i.e. Cell > N11) →		← Isource input / Isource output →		Assume
	Vector	Ext. X86	XA (APx-style)	XA duo-style	No stand alone.
FP Perf	2	1	4	3	← x2
Int. Perf	2	3	4	1	
ttdemu	yrs ①	yrs ①	now ④	6mos ③	
ttapnl	~~1.5~~ 1 (3)	~~1.5~~ 2 (2½)	~~4~~ 3 (2)	3 (2 yrs)	
Custom (intel desir)	4	2	4	4	
Compler Anal	6+~~Hw~~ 2 ①	6+Hzi ② (easiest)	~~4~~ now ③	~~4~~ now ③	
Perc. ISV diff	~~3~~	~~4~~	1	3	← x2
OEM diff.	3	4	2	2	
OEM Perf Perc	2	4	2	2	
Chip design diff	1	2	3	3	
86e Custom input	~~1~~	1	3	2	
Intel input	1	2	4	5	
~~hi bandwidth~~ Plan9 Rewrite	4	4	1	2	
~~O/S upgrade~~	31	43	41	40	
~~debugger, tools, linker~~					

(1 input / 1 output only XA of interest.)

~~only~~ XA of interest ~~Hyp~~

Intel invest	19 3 34	27 4 47	11 42	12 42

64-bits to Kevin Kahn.

- more VA can map large physical than Unix.
- Perceptron — There's a future! Need a Story!

1. mapped files; image / T.V.
2. Large / sparse + large proc.
3. Very large. shared, global address (Net)
4. Servers.

⑥ Mm
① Steroid – 88k
② KSR

A. Def. B. Offman

Goal To make the x86 live forever by being able to extend its performance for a range of apps to be competitive with RISC-based (4K, R5GK) w/s.

XA merge (1 input, 1 output. 1 compilation) No standalone S/G

Bell believes you can not kill the i860! Can we NOT do N14/N15??

Start with XA/iPX and evolve to true s(h)mP → wimp.

11/16/90
- Technology → constants
- Apps.
- Corp. Goals.

Set in a box
Fax, phone, email ↔ knows the systems. (Picking up mail)
↳ automatic answering machine — voice mail
— dials, redials
— makes the patched

11/21
Dan Gray — at Intel Rambus Interface =

Intel - mind limited
- conservative → goals
- customer base.

Why 64 bits?
11/29 Apps for large VM EV-4. 8K × 2; 4 Mb/sec;
- Files/DBases
- Simulation
- Video.

1/6/91 Meet w/ AY.
Rambus opportunities (Tanmoll
Graphics: graphics 2D, 3D, Video (incl. teleconferencing), image processing
Voice into the PC.
PC of 1993: What is It?
PAC leader: Who could It Be? {Perf, Arch, Graphics/Video, Protos,

1. Looking Glass ≠ Next Step.
2. Talked: UVC to meet re. (Jean Clang Eglaine) - 860 lecture. Dean Pierce mtg.
3. Get Dan Nelson 1/8 in pm, 1/11
4. Velox.

3/12 Rambus: Cost reduction; Interested, hs limits
64-bits: >4 Gbytes; Market alone, but no applications
What can a 64-bit machine do that a 32-b computer! Net distributed? Object-oriented?
→ file mapping, environment, Lisp

4/1 Ari Weissen: Demo on 860/
Memo on RAMBUS; Merge; 64-bits (Kain Kain)
586 ↳ 860, Graphics,

1 day · 10/26/90 SF2 ; 11/14 [illegible] ; 11/20 - 9-, 2:15 ; 1:30 - 5:45 ; 5¼ → (.75)

2/91 intro. if 5 Beta. — Bay area
11/7 Beta-1, @ 1/month (2 in Nov.) ~ 1 SGi, ULSI Tech (Promis), BofA Funds, Genrad, Oracle

1982-85 comp that was MSCP-re. sold co. to SI. Stimulated by DSC
-12/86 sold 2nd comm. co.

4/87 - 3 full-time people. early '87 Start thinking about an opportunity, RAID, small drives. (
8/87 Briefly — Self. funded 5-6.
(test mkt. thoughts on mkt. Handshake (4M
10/87 1st authored business plan. Oct. Crash...
2/88 Closed
→ 7/88 Closed financing. 4.5m .50/sh.
8/88 1st emp... staffed.
11/89 2nd fin'g 5.0 m. ⇒ .70/sh

9/90 3-3.5m ⇒ $1/sh
2-3/91 (need next round). 500K/month
40p

How to

Accounts

2 problems

1. How to do incremental backup? what is persisted
2. How to do a 3 level store?

Product

- Data-Sheet,
- No formal, no functional Spec., PC dev. env

Exabyte - Cart = 4 or 8 for 112 tapes
Sumus - 50 x 5 Gb/l

Exabyte ~ 2.3 Gby ; 4 0.25 Mbytes; ‖ worms 3 Gbytes; 0.25 Mbytes/s

5 x 50 Gbs / 8 mm. carousel

TPI ~ 100 ~ 200 bytes of text → x 2K tp/s → .4 Mb/s → 1.4 Gb/hr

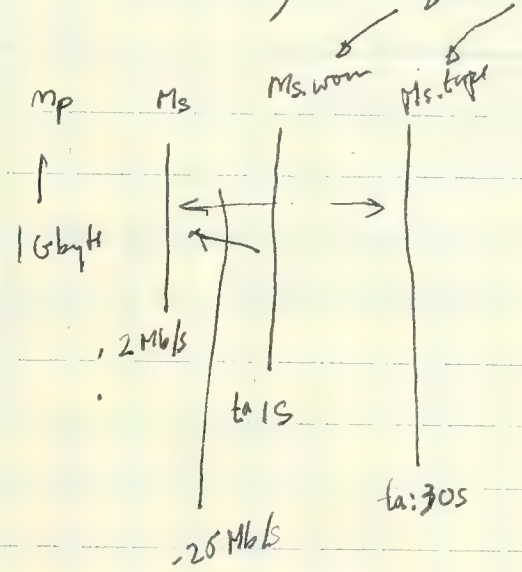
UC/B → 10 Gbytes → Δ 20 Mbytes/day. (500 Kbytes/user/day.

10 Gbytes (changed day)

2000 x 200 ⇒ .4 Mbytes/sec x 3.6 x 10^4 ⇒ 1.44 G/hr.

SF2 Config ≈ 4 x 6 packs x 3 x 10 = 720 drives = 720 Gbytes

Mfg. Dec Env. > 100 Gbytes.



30 I/os	300 Mbytes	- 1 Mbyte/s	$2/Mbyte
"	2 Gbytes	- 2 Mbytes/s.	$1 Mby

2 Situation: backup / tape libs

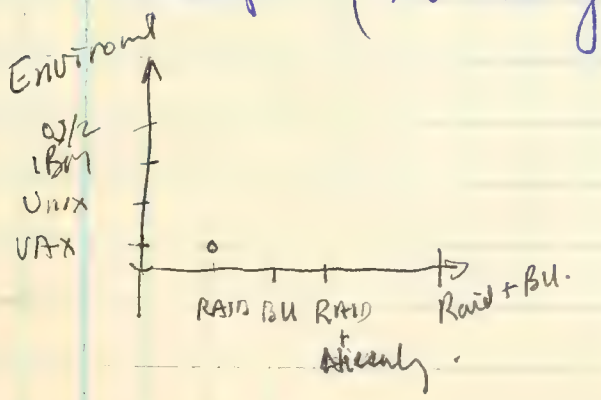
Rules of thumb / Site

- Δ backup / day. Full - weekly / Bi-weekly.

20% / day of Δ backup

Peter Doob Darby - VAX Expert
Dave Joffe - Arch
Tom - Eng.
Tony Schaller - MKT

Backup (Nomograph) of time, size, data-rate



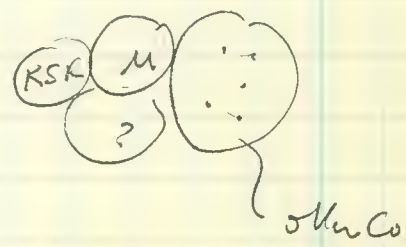
KSR 70's - 360 Range, all mainframe
80's - VAX " , new Unixby, Comm.
90 - KSR " , ∞ Compty, Range of Styles possible

10/31 KSR

ibm / Shaffer compan / Karl Wassman?

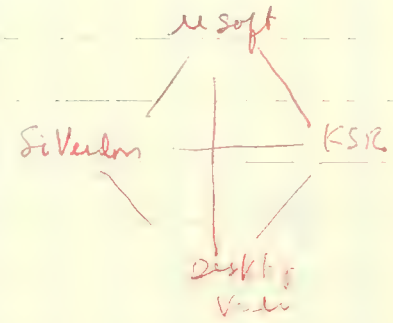
Semis	Semis/systems	Semicomputers	System Semis	Systems
AMD	TI	Intel	HP	Apple.
National's	ATT	Moto	Dec	Next
Cypress			ibm	Compaq
LSI			integraph	ncr.
IDT.			SUN.	Unisys.
	Sony		mips	~~Control Data~~ CDC
	Toshiba			BULL
	Fujitsu			ICL
	Hitachi			DG.
	Nec			SGI
	Mitsubishi			Pyramid - Dick Lucier
	~~Matsushita~~			Prime
	OKi			+ Microsoft
				Bell Core

1. Foundry — partner, investment
2. Pull with a partner — co-float, nib
3. Replace, again 32-bit P/L.
4. P/L for low end.



Candidates

① MSoft.
Apple.
Sony
② NEXT
③ Intel
TI.
Compaq



why Desktop? 64b, scalable, UP compatible, Simages/video.

intel.

- $; Si foundry
+ Help America, Design Environment,
  64-bit RISC dual chip; Unified arch for Proc, Viz, Image, i/o.
  mP transparency,
+ Get a coherent SuperComputer Contin.

Why
- RISC That, 64-bit, Future.

11/1/90 Fluent Machines ~~Fluid.~~ 508-626-2144 Dave Nelson, Dick Meese,

Video Encodings

- P64 - Video conf. (picturetel)
- MPEG - motion video.
- JPEG - still image
- ⋮
- dvi for now ... evolve to MPEG (DS-1).

Video i/o

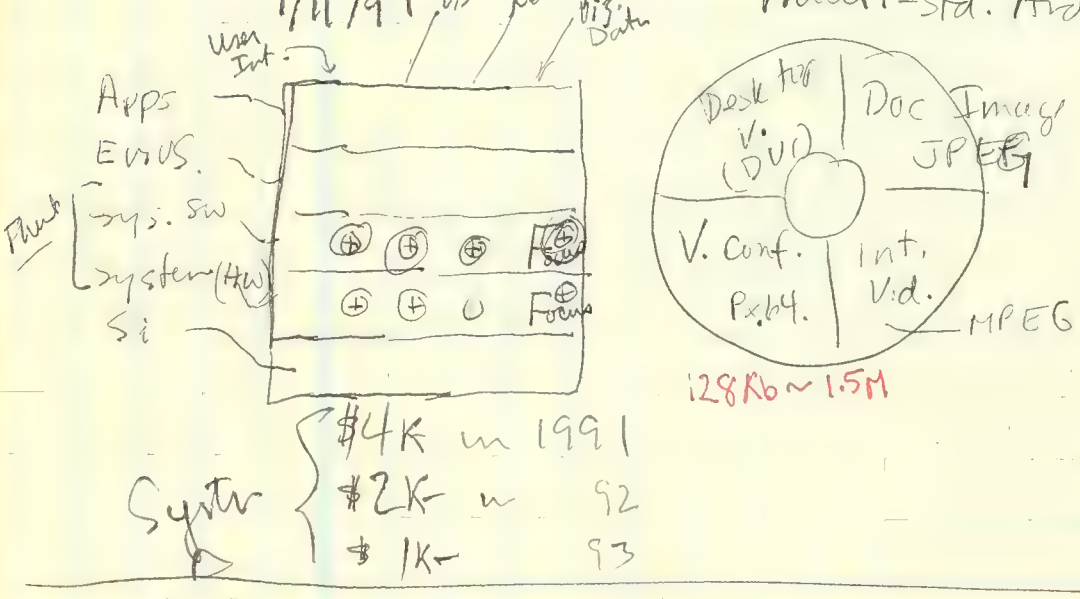
NTSC, pal, SVHS, VGA
in + out

mips/usoft deal.

Gates positioning OS/2 for RISC. NOT CISC. Uses mips not intel. 20%-40%.
Cutler uses OS/2 arch. independt.

5 Functions:
Capture (i),
Store
distribute (switch)
interact.

Present (o)



Multi-std. Arch.

Syst $4K in 1991
$2K - 92
$1K - 93

Looking for Partners:

1. Chip partners -
2. System vendors -
3. ~~customer~~ i.e. Applic. Developer -
4. Customers??

$, Perf, Capacity (channels), platform

Si Relat. 1. Audio+Video Compression Silicon - Intel; C³; V3 is the real Product;
2. Bridge -
3. Analog/Digital ~~Apps~~ parts -
4. Just mips (Pc) - 960; 5.

- Scaleability - compress, rep. of video.
- Adaptability -
- Concurrency - multiple streams.

Intel Intel DVI - RTV; PQ Video - Production Level Video → add JPEG 750 parts
Real Time Video

Boards - Display Board, Capture Board, RTX (O/S) → AVS File format; AVKernel,

Transcoding among file formats

- Laptop Video (Videoman) ≈ 8mm. playback only.
- Notebook w/ < 1K$_{92}$

10 base T

- Interactive Vis. w/s (1~2K) ≤ 1K$_{92}$ → .5K$_{93}$.
  video (compute only)
- Interact Vis. Commuter (3K) < 1.5K$_{92}$
  Video i/o
- Author / Production w/s — VCR, Video Push < 4K$_{92}$
- Desktop Video Production
- Computer Based Training

Disk farm — Fibre Chan

Transcoding tools

1. C.B. Training · Course Preparation (+ CBT Education)
2. Video Production + D.T. Production (video)
3. Video Mail
4. Video Conf. (PT→PT, multi-person) (Desktop + Central Sit)
5. Presentations.
6. Kiosks P.O.I. Real estate auto parts Mechanic
7. Assistant to: x

- market can be made before "Big SW" offers products.
- Market can be made by "1 to 3" applications that have meaningful use serving a need in current PC environment.

5/2

Scalable Video · Network opportunity · Uniqueness: "Dialable" (i.e. Scaleable) Video, 2 channels, SW.

Video Enhanced Computing ↑

		Near	Long
SA (or should be more)	Training (CBE/CBT)	1 (2)	
O	Video Conf.	5	2 –
SA	Video/Shell Access (Kiosks)	3	
SA.	Desktop Video Assisted	2	
O	Video Mail	4	1 –
SA.	M^c Presentation		
SA	Video Entertainment		
	Education (Systems)	(1)	

Need
- MKT Filter
- Critical Partners + MMap.
- Computerized Knock off chart.

Television time shifting

(1) · Mail
(2) · Clips for time shifting
(3) Education
(4) Presentations
(5) Conferencing (pt:pt)

12/10/91

BMD Products 11/5/ Ronnat / Ted:

⇒ Sort by dimension for custom use (eg. SF2)

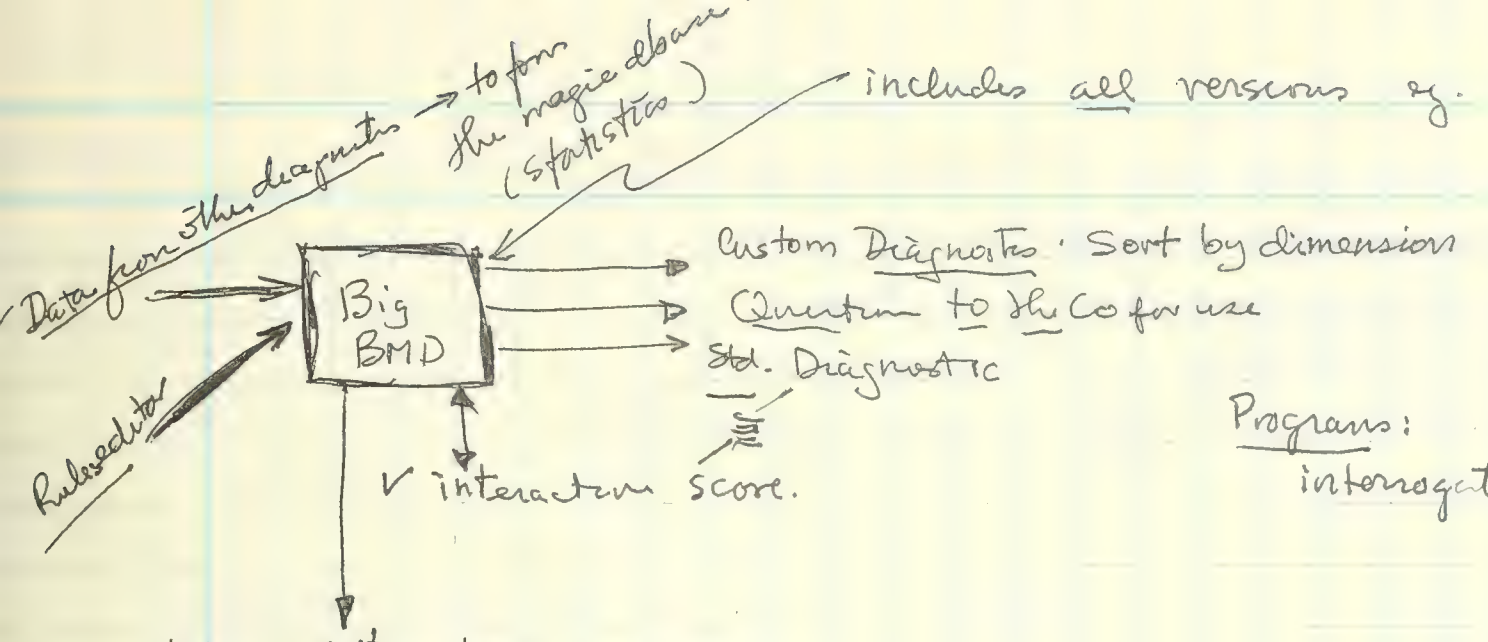
→ Intrapraun vs Entrepreneurs vs Support / Infrastructure / Academ

→ Corpsthybrid → validation, database, serum referral

— Geography:

→ Technological Specialization. eg. biotech. materials, IT

Products
- Courses ← VC, Entrepr, Infrastructur
- consultants
- programs → Self-monitors
- workbooks
- newsletters
- ◦ licensing to ?
- ◦ books.
- Franchise Audites
- Marketing, CEO, etc. Program for a subscription SVC.


Data from the diagnostics → to form the magic data base (statistics)
includes all versions eg. I/E
Service, H/S etc.
Components ← Mfg. Eng
Big BMD
Rule selector
Custom Diagnostics · Sort by dimension
Question to the Co for use
Std. Diagnostic
interaction score.
Programs:
interrogate, prescribe, carry out rules, collect data, analyze data
presc. letters based on answers.

Rules; rule values; Version # for each rule → form print out

Co. Background

Co. evaluation = rules, comments, scores, co. info, → plots, scores
→ letters (Co. genera

score Table for Co. : 1 card / stage

11/10/90 March Conference: Platforms of the 1990s

Who talked at Shafer's Conference?

Mainframes: Irving Wylanksy-Berger, JP ibm -

Cray: Steve Nelson, Bob Ewald, Worlton, (Gen Smaky?)
← ieee mtg

nec:

~~Cray~~:

Dec: Fuller, Strecker

OSF: Ira Goldstein

~~Unix International: Norm Doting~~ use Sun

---

intel. - House, Rash, Gelsinger, ~~x86 PM~~, ?

uSoft - Gates, Cutler, Balmer, ?←

Sun M. Rosing, Joy, Bechtolsheim, Jim Mitchell (OS's of the 90s)

Apple - Kay, Heiner, Sculley,

ibm W/S's - R6000

Visix - Desktops

Alts

- Dave Gifford → mit Environments of the 1990s
- Steve Jobs - interpersonal computing
- Stritter - mips,
- Sony → ~~Kay~~ ~~Mike~~ The Consumer impact of Comp

Questions

1. When Email ?
2.

Rules for Slide layouts for video

- ieee format / Guidelines
- Like to view them all with critiques
- Time will be allocated on basis of graphics and content.

1. What is the vision for platform environments over next decade ?

2. ~~What~~ How will the perf & functionality vary with time ?

3. What Apps can possibly use the power

4. With lower cost platform solutions through new channels what to role/vision of hdw co ?

5. Any hope for interoperability / compat. ? (what does stds. stack work like at each level of integration ?)

ibm → Big "DASD" holding market up !

UVC:

- Lecture series (Package a set of tapes, Get a study guide, Invite it up)

N-books

1 → BMD
2 → Tradit. SU w flows, rules
3 → Tech/prod. of 90s : Gen.
4. → Manager Tech. TBS

560 Leglise / Dick Pierce - MIST Mgr

shaping ½ x 3 wks 7.5

productn (Larry) 3.0

NTU - Kinnell Baldwin Exactly lecture 35K.

Tri

T/E

SEE > 1.5
Wrong tech – too much HW

?

· Product Illus – E
· Mussed

Mfg

· Can't build it / Viatron

Plan

MKt

· Dsmt / Wall St. –
· Saturated;

Sales

Ceo

Team

Cash

Financials

Control

Fortune

708-953-8440 Brass Plaques

· Viatron: 72's – MOS – too early
· Trilogy: 82
· ETA: 1989 – scalar
· Cyclone, 869 – 1904

· Digital Photostore · NCR cram
· Ebeam mem · RCA Mag. cards
· JJ · Plated wire · Thinfilm · ibm – Sys. 111 cards
· Drums · Delay lines · Selectron
· 30S, i^2L · DTL, RTL
· Light pen

· PL/1; CPM; algol. Visicalc

· Osborne
· Workslate

· Dec
4, 5, 6, 14, GT40, 8/S;
11/60, Decmate, Rainbow, Pro.
730, SUVAX I, ~~off the tech curves~~,

ibm
7030, SIII, ~~Lore~~ send PCs,
· GE proven control,
COC
Star (post Cray machines),
W/S – Symbolics, LMI,
100 minis
GA, CA, ..., SDS.
Apple: LISA, AIII,
Xerox STAR (alto, Dorado, Dandelion

1. Complete product includes Apps.
2. World can only tolerate a few ISAs. (65)
3. Supers – throw 1st one away!
4. 11 Rules.

Encore; Titan; (failure to make deals)

Intel
432 → Bin;
Micro 2 9000, ~~80~~ 32X32, 88K,
Mini-Supers
· FPS, Cydrone, multiflow, Denelcor, Alliant, SCS,

Supers
· Chopp, eta, ASC, post Cray's of Lore, Sci Apps.

– SEQuent
↕
– Encore!

1/21/91 SF2 申 10-

Exabyte 8500: ~~5~~ 5Gby, .5 ~~1~~ Mby/s, 10 stacker (random) → 50 Gby.

~~12~~ cartridge / 4 drives → 600. Gby.

8 drives.

Perf. ~~$~~RA90 - 500 Kby/s

SF3 Box - 357 Kby/s. at 200 Kby blocks

SF2 should be able to "save" VMS N's by not Xfering data to host on BU.

Super Prob Solv
- V Skilled - concrete probs, practical, tangible
  Less in expressing - word
  Very Systematic, Make A Plan
  Very well org.
  Enjoy Ordering

JW

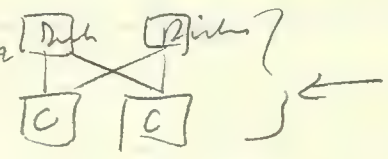
- ironic - extremely bright, doubts own abilities,
  - orderly suggestions register as pain, Anger.
  Very Defensive.

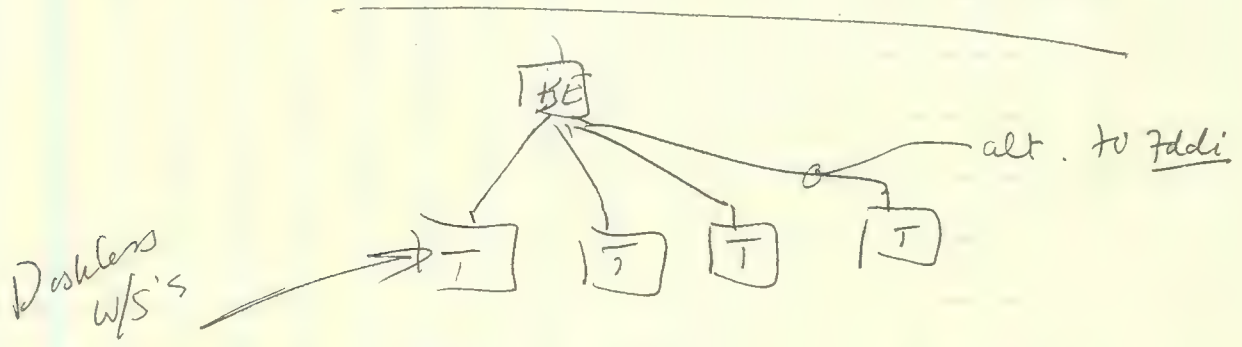
. Prod . VC Relationship . Possible Relationships?

Cascade 2/17/91

Merrill Richard (Stu on BOD); Segnia (Mike: ~~Monk~~) ← still in st.; age, Barrett
(Larry Mohn)/Dandor; ATV – SSPet ~~lost~~ no BOD.
BOD Brun, Mark Perry (exec VP SGI, ?), Frank Marshall EVP Convex.

Uses: I/O – switch/bus (SUN)





Xtp 3 chipset + fddi chip ≈ 10 Mbyte/s.

Reliable, P-t/PT, DMA ( ), By-pass comm. protocols ~~ET~~
(25Kg + 1.5K static) → $25; NRE → 50K; 5K/mos. equip.

Unix Server – 55K/yr. (installed base notified)

Fiber Channel – 265 Mb
" 1.2 GB
DEC Turbo. ch.

S-bus, 25Mhz × 4

VC Relationship:

Board Business: VME; S-bus

100 $25/chip

Endpt = 2.5K. for fddi

$100 for Cu, $200 for fiber. fddi chipset, board

Taxi → 4B5B
125 Mhz
= 100 Mhz
= 175 mers (28K mil) bipolar
Taxi → Design chip
3P @ 10 months
Viterbi is intended

Possible
- VC (Cirrus) →
- Cirrus Part.

George Smith,

IMS 2/18/91

Design 80K bytes + 50K gates. — 3250/W; 3250 Proto (ext. SRAM)

Byte sex, cache, Mp. assmptn 3250 R (int. rom)

P → W → R

9 – 16K×4 $s

W → 16K w (

via 32K w 24Kw – 6502-2, 68K-9, X86-9K, QDraw 4K.

$2.5 X 10^6 Conlust @ Apple, $\frac{2.5 \times 10^6}{104} = 250$. – 3 emulators, + Motherboard, display + 386 — 1.5 .. NCR

? .. DEC

could be protected, each env. is an object.

executable img

Product optns — HLL Interpreter (Small Talk, Lisp, Forth, etc) → +C, C++, C&&K

↓

ISA Emulator (6502, 68K, X86)

ISA + Applic. Accel.

ISA + HLL I (

ISA + I/O hardware assist — graphics (XGA)

ISA + functions (QDraw, Postscript, ... — Call accelerator (circle draw)

ISA + ?user code?

1. 88K – 2-4 cpi = 3250.

2.

"Channels" Decoupled Arch fetches instns, data, etc in parallel

4 object channels – List, 2 source, 1 write – Objects

2 chans ea for instns / deep pipe; 1-R/W chan 2-32-bit words

is a custom circuit way

Speed est. ~~4.56 at 25~~ (386 at 25 Mhz = 40 Mhz · at 3520)

3250R – 1.25W; 40 Mhz.

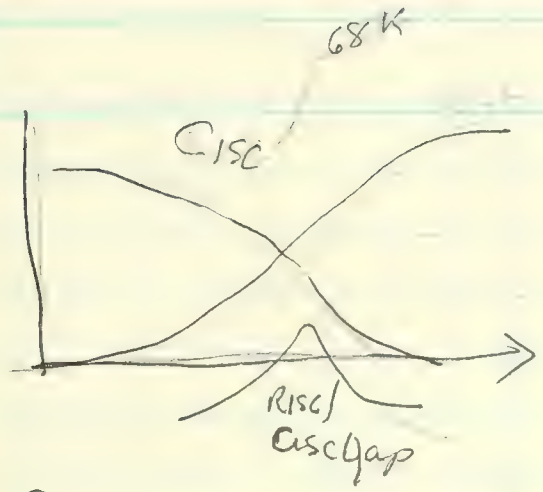
Seiko ~~NOS~~ smos – $750K NRE (design +) 6 mos. nec, ~~Seiko~~ (350 mil) → .8 μ; 3 level metal

↳ 200 people $28 → $15

3250 P smos ~~$90~~ /part; +6 mos; $90K NRE

1. Need performance

~~warrant~~



(1.) License + Royalty per part (non-exclusive) → Not 2nd Source
— Escape hatch.

(2.) Other product design

(3.) Acquisition: 17m sh. ↔ ~~$~~ .30–.50 /share.
1/4 insiders, >1/4 close friends, rest public

George "we build good Cyrix". "Cirrus builds good chip. They're best in a fabless business"

Cirr: • tape out in Sept. or Xmas
° 6 people.
° Prices > $28. Bigger die

→ Way to get in 386 emulation biz.
→
now quickest time to mkt use LSI Logic

Dick Grasso → at 1:00

From. Exit >: RTe 30 East Bound, 1st stop Sprees, turn Left. RT on Old Conn. Path,
Prism 1st after X-over Dich°

F/E - ratio

Salmon 400K / person - 200 sales calls/yr.
· 32 sales calls to make a sale.
· 2K/Sales calls

3/20

Mktg. — Marketing — none!
Sales — no control
Product, — not differentiable.

Eng. — fine, but we can't afford it;

Ceo. — completely head-strong., developer,

Team — probably not one,

BOD — no effect, casual, infrequent

Control — processes run rampant

Financials — out of control.

~~[redacted]~~ $ 75K

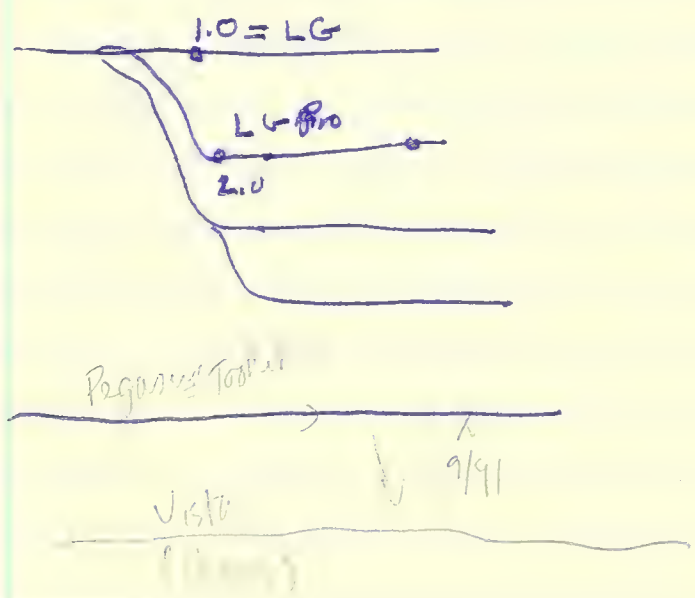
Sales:

oem / exisity .
govt .
major accts. .

Resellers:

Acquisitn — Ashton-Tate Full Write; [redacted] frame-like; describe; msoft -excel/word.
Islands Graphics
OS/2, MAC, .. products.

Product



4/3 →

Shulman Report — RISC + Microsoft is now independent of IBM.

Collision Course
1. IBM → OS/2, novell, SAA, Patriot Partners,
2. Microsoft → no platforms (team w/ MIPS), agreed to port ~~to~~ NT to α
3. Sun – mkt leader, threat.

: └ Bus Development person. mainly with Jay.

HP
- HP: ~~old~~ own its own.
- Apple:
- ATT V.4

PC clones

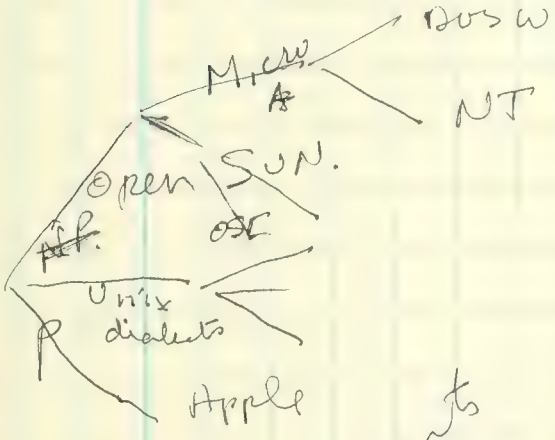
Risc
- >para, · MIPS, ~~also~~ SPK –
- · ibm, HP, DEC to come. α,

R
CLS
- i x86, 860
- 68K – apple, HP, Next

Dec
do it all

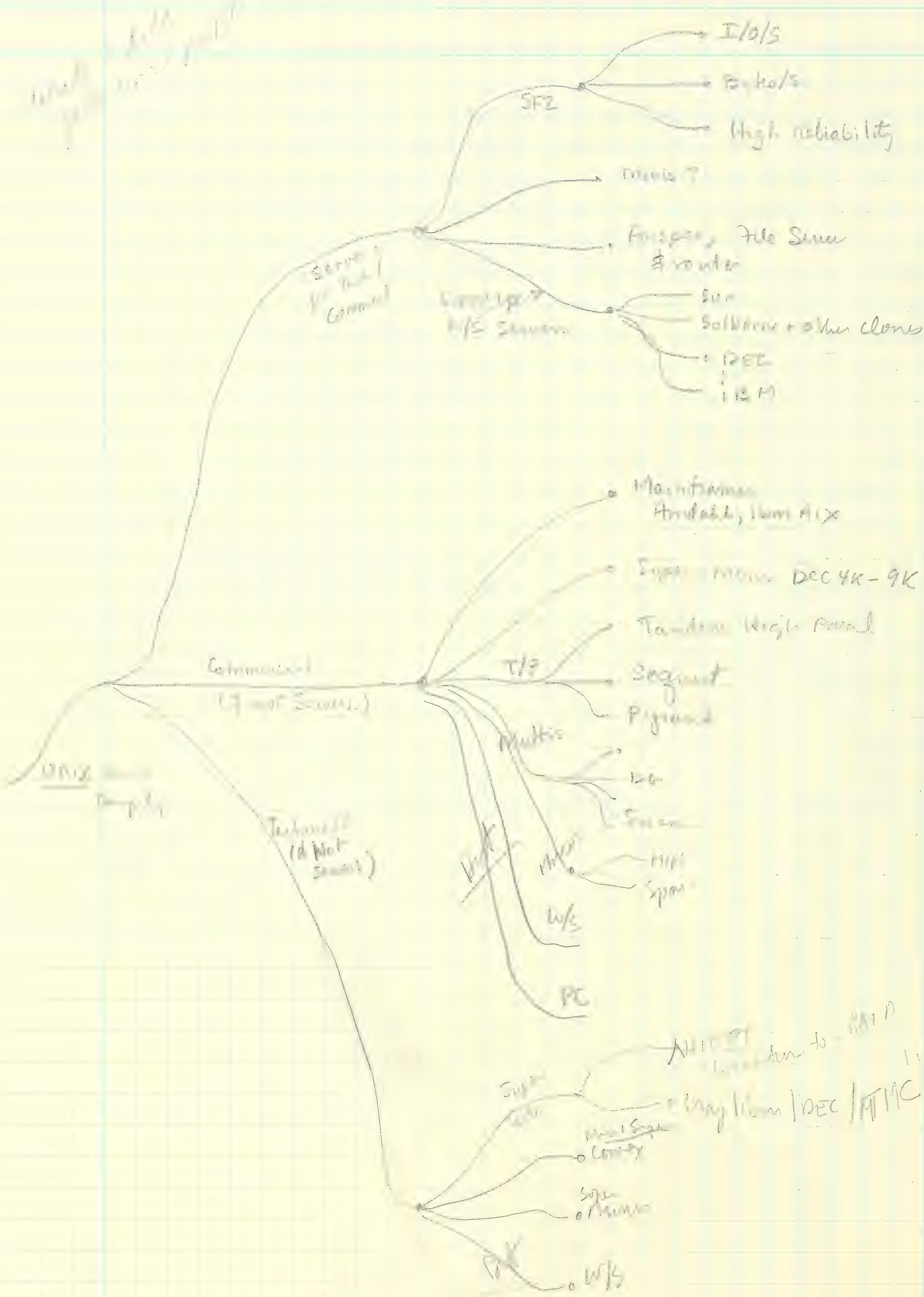
Sun
but it all on sv. OS

Apple
MAC → Unix env.



Plat

# of unique environments
—
—
—
—


I/O/S
SF2
High reliability
Mainframes
Fileserver, File Server & router
Sun
Solbourne + other clones
DEC
IBM
Workstations
Apollo, Sun, IBM RT
Intel Hypercube DEC 4K - 9K
Tandem High Avail.
T/P
Segment
Playground
Multis
Unix
Technical
(& Not Servers)
Mac
Sparc
W/S
PC
Novell
Sun
Banyan/DEC/IBM/PC

intel

4/1/91

Albert: 1. RAMBus is really only good for 860, graphics due to latency
2. 64bit mem — get a focus from them but Sparc
3. [illegible]
4.

Legrise

1. Simulate RAMBus + 860
2. get a Table Benchmk vs 486, 860, Mips, Sparc.
3. Put together a plan. Two platforms:
   - DOS — Environt for W/S.
   - Unix with DOS — Unix to run PC compat. SW

   Be driven by ISVs!
4. Jun 5 AM 860 Announce [illegible]

64bit 5/14

1. Can another processor emulate an existing program faster than the original?

Form of a proposal

1. Def.
2. [illegible]
3. Choices (cost, t, perf.)
4. Benefits, Rewards, risks
5. Next Steps

5/[illegible]

[illegible]	[illegible]	[illegible]
[illegible]	64bits with interconnects	with help apps

Keenan
Horn
Uri Weiser
Fiss
64 bit

~~4/8~~ 4/9/91 BMD Large Co. Model
DEP, → 2 → 3
Build infra Deploy

ID e-dev - L-dev, Deploy, ID2 D3 Acq mtn
· MKT Valid Bus Prac. Pos. for growth.
· closing, sales

Beliefs · dishonest — slow system (2 sets of ~~books~~ books)
· Can't get product, thinks they are in territory

11/29/91 Location / B/M
Chuo Shinko 中央 CtC
JAFCO → audit, pre-IPO,

1. Fund
2. Sell BMD — 1. Venture in Japan — 1c
2. Large Co. — Small co / consult + Chuo Shinko
3. Build translation

Chuo Shinko - Acc't Firm → (dull)
(Chuo Shinko)
- Large Co. MKT : Kubota, Fuji, Asahi (Need JV Partners to sell / Tailor)
investing in U.S. Co
- Large Co MKT evaluate need Infra → Long Sell Cycle
Cultural Δ
- Banks - M/A groups, etc.
- Japanese ⇒ Venture Cos. —
- Japanese — invest banker — fire work + fees
- Trading Cos → want to find out what you sell,
Training, hot line, fax for support,

Patients

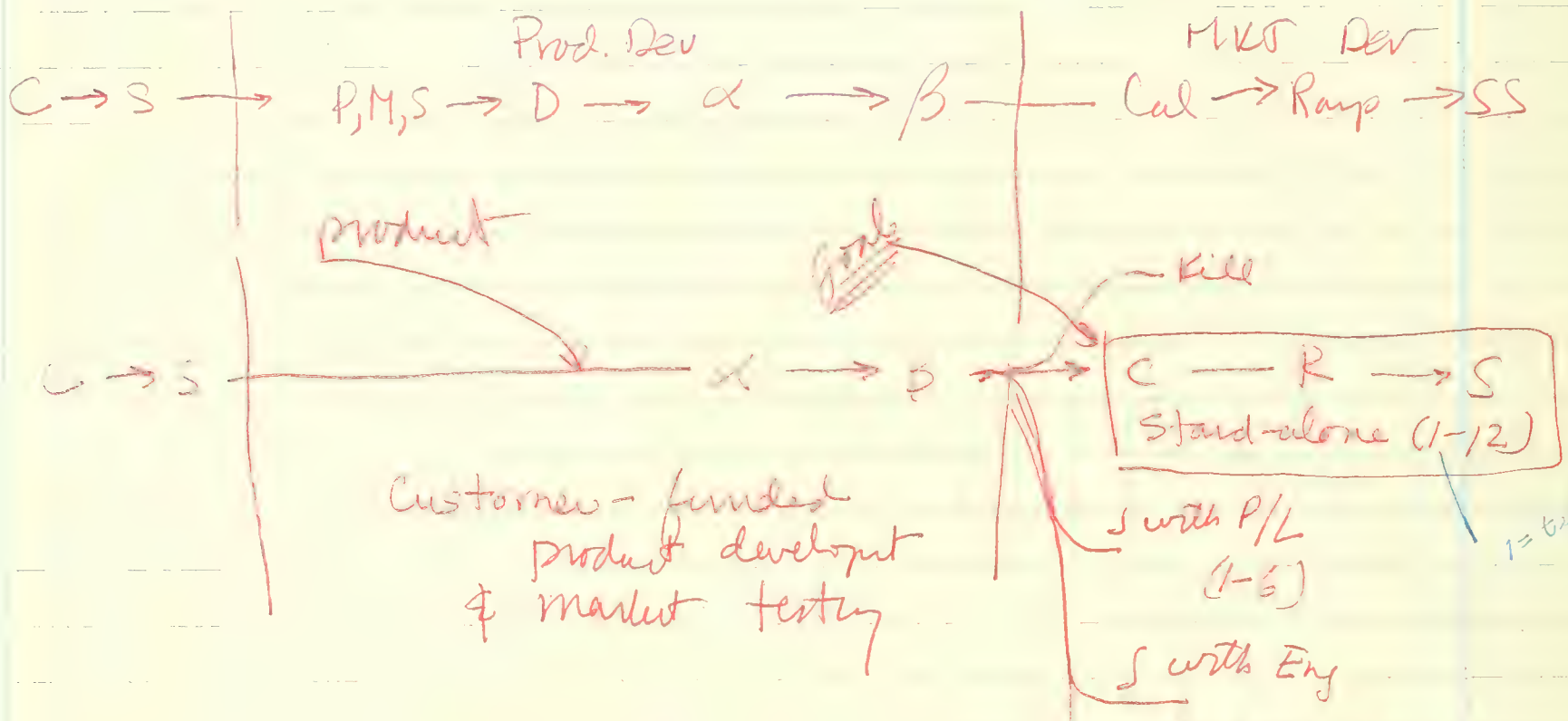
US Small Co.

Japan Small Co.

Japan Large Co.

5/22/BMT - Dec.

- Three variations: 1. Big, Joint Venture.
  2. Market β.
  3. True, venture



(Typical DEC Ventures)

External (Big, Joint Ventures)
- Quick Test
- Due diligence
- Track venture

Todo (Paul)

1. Audit existing N.V. Bus. — Track, form ideal Profile
   (do a quick version w/o ask questions)
2. Profile all 237 Resch Projects for Sam Fuller — Quick Test for potential Product Development
3. Due Diligence → Business Acquisitions

Problems with DEC V. Plans

- No Market + Sales Plan → just a list — where to focus
- No True financial plans with allocated sales/mkt Cost
- Need consistent plan formats
- No people time
- Financial scenarios about end game

Unable to figure this out

VISX

Pegasus 7/10/91 @ MIPS...

Pitch: 1. The first to market with a cross-platform, Standard environment wins!

2. There will, by definition, not be multiple environs of this type because that would defeat the idea of a std.
3. MSoft is the only co. to do this!
4. If ibm/apple/P2 did it, it would most likely fail to be a std. ~~also this is the beginning~~
5. It must be done now and fast!
6. This shuts out the possibility of an event by P2!
7. Both Standalone + Dist'd Platform

→ One Develop Env. & Desktop Environs

→ Perf. gains → bypasses poor code in motif, et al.
– Standardizes across Unix & eliminates options.

Gordon B Table

- 50 - Visual - , dress, stance, move, gesture
- 30 - Sound-like - speed, inflection, pauses, etc.
- 10% - Content retention

Write my own introduction! Sets stage.

3 points: P, pr, fut.

audience profile: draw

What ex

Guys — non-sexist

use more specifics to back-up ...

12/3/91 B, M, McM (phone).

1. CTL: close, contact, sell, access to deal/database.
2. Stavers: Don't see how we can lose. Will work on ~~efp~~ San Jose, introduction.
3. Dec will let Paul consult, but Terry is a deal maker.
4. Terry Potter – would like others to buy. Intellectual side: sees it as 1 of many tool
   3 tool users → Terry; 1 woman + Pat McM. (Office buddy consulting barriers).
   Preferred way: 6 people in a distd fashion.

PMcM Plan: 12 mos. – how many billable days? 90–100 days. 2K/day →
Program

12/4/91 BM.

- Comp. vs. equity
- Don't include mgt in equity pool.
- Not planning for acquisition; but make good living in present
- Pres. of whole enchilada. Area presidents. Consultants on contract for most work
  Birkman for Payne.

We willy to give up majority i.e. 60%!!
Europe & Japan Franchise
Diagnostic (BMD) for our own product/plans ⇒ Paul's Plantable BMD
Forecasts → earnings; product royalties

1/7/92 George Turin – Teknowon 8–10 years (Thermo Electron)
use Teknowon as model for "intraprenenurship"
2 people = boundaries – inside | outside
- no equity initially
- peers, mentor, training,
- 1/year; 50% success – stand-alone.

let me build in | let me sell it

now go to 3–4
TAB link to 1 faculty member – entrée to customers, tabs, technology, refer staff
Intrapreneurs – NO Reward

12/19/91

~~12/10/91 Thurst TARS.~~ Sept 88

- 16 ns / node

2 → 8 → (6)

2 → 12 11

64 byte → 640 ns access

1 Gbyte → 1 Gbit

ecl. fiber

2 bytes / ½ Gbs

7/16/92

3 bytes → → / stage

→ Cray X-1 Cautions:

Dist'd memory model. Locality.

7 11

- Go for DEC's base using X-1. (25)

MP ① 7 ns ↔ ② 28 ns ↔ 180 ↔ (100) 720

Block move, Pre-fetch,

~~Cray~~ 10/12/92 Fujitsu — Announce 9/1992
VP2K 4×1+4×15K → Pre-announce 9/1993
VPP500
850K → 350K
16 16
→ 256 Mbytes → (4 Gbyte)
a lot of programs are large . ∴ smaller # nodes.

Fortran → search for a language s.t. TMC runs well.
↳ machine language

SSU → 1-32 Gby.

72 K .2 ns 2
→ 400 Mby/full duplex; 3 usec startup. or 5-10 usec.

Bottom-up vs ⟷ SIMD.
machines are bottom-up @ it
i.e. multiple processes

Parsytec
Convex
DEC — Wildmark